NOVEMBER 9, 1935

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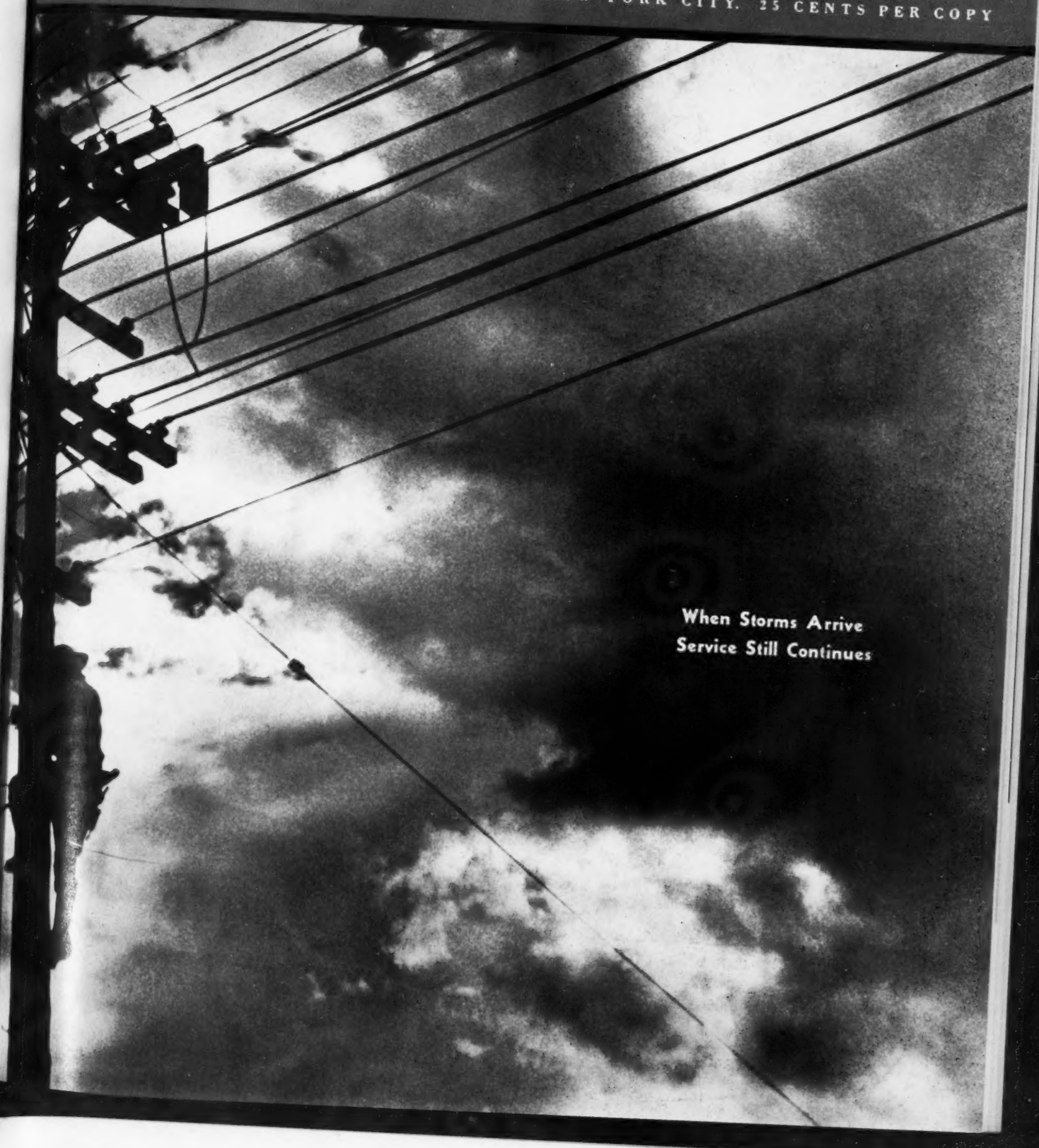

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Reader's Guide to This Issue

This index is merely a convenient guide. Many articles will appeal to several reader groups—many will apply to all. News and other departments are of general interest.

●

Of Executive Interest

	Page
Holding company regulation	21
Planned extensions	26
Laundry equipment for load building	28
Company personalized by D.R. plan	34

For Power Company Engineers

Cable halves cost of service extensions	24
Planned extensions	26
Self and mutual induction chart	37
Uniform network vault design	52
Arresters cut insulation costs	52

On Power Company Sales

Holding company regulation	21
Laundry equipment for load building	28
Company personalized by D.R. plan	34
Power salesmen pay their way	70
Plan to raise home load	70

For Electrical Engineers in Industry

Stream gage data by radio	31
Resistance furnace capacitors cut costs	32
Self and mutual induction chart	37
Electricity aids levee building	58
Power drill adapted as agitator	60

For Electrical Manufacturers

Holding company regulation	21
Cable halves service extension cost	24
Laundry equipment for load building	26
Resistance furnace capacitors cut costs	32
Arc welding speeds production	60

●

Coming Features

Choosing a Supervisory System
Banking Distribution Transformers
Better Sight Load Building
Generation Costs Analyzed
Carrier Street Light Control

CONTENTS

NOVEMBER 9, 1935

Holding Company Regulation 21
By GEORGE C. MATHEWS

Cable Halves Cost of Service Extensions 24
By G. S. VAN ANTWERP

Planned Extensions 26
By W. W. PALMER

Laundry Equipment for Load Building 28

Stream Gage Data by Automatic Radio 31
By IRVIN M. INGERSON

Resistance Furnace Capacitors Cut Costs . . . 32
By W. H. AUSTRY and W. H. CUTTINO

Company Personalized by D.R. Plan 34
By N. G. REINICKER

Self and Mutual Induction Chart 37
By A. F. ANDERSON and L. R. VIANEY

Editorials	19 and 40	Men of the Industry	74
News of the Week	43	New Equipment	86
Operating Practices	52	Book Reviews	92
Power at Work in Industry	58	Recent Rate Changes	97
New Engineering Ideas	64	Municipal Items	98
Building Up the Load	70	Sales Opportunities	102

VOLUME 105 . . . NUMBER 23

Contents Copyrighted, 1935, by McGraw-Hill Publishing Company, Inc.

ELECTRICAL WORLD—Published every other Saturday. Price 25 cents a copy. Subscription rates: United States, Mexico, Central and South American countries, $4 a year; Canada, including duty, $5 a year; all other countries, $6 or 24 shillings a year. Entered as second-class matter, January 20, 1907, at Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U.S.A.

Branch Offices: 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

Printed by The Schweinler Press, N. Y.

McGRAW-HILL PUBLISHING COMPANY, INC.
330 West 42d Street, New York, N. Y.

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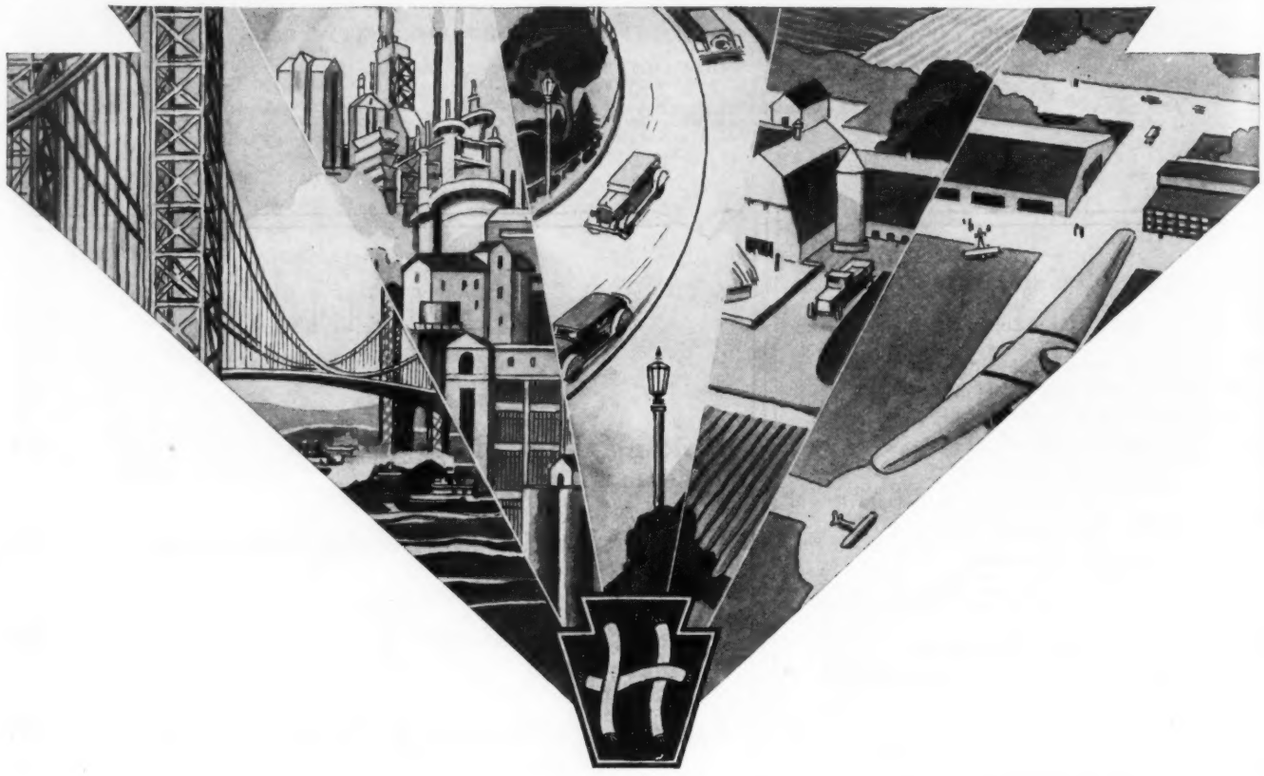
Underground without Conduit



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Facts and Theories in Regulation

WASHINGTON releases have led the public to believe that all the problems of the utilities are solved with the passage of legislation that forces corporate ownership changes and introduces federal manageagement. This is erroneous. The problems of public utilities are economic and are largely independent of corporate structure or form of ownership. For the utility business is a dynamic service in an ever-changing environment. Proper utility regulation should be designed to protect the interests of the public, utility management and utility stockholders on a partnership basis and not to introduce federal centralization and management control.

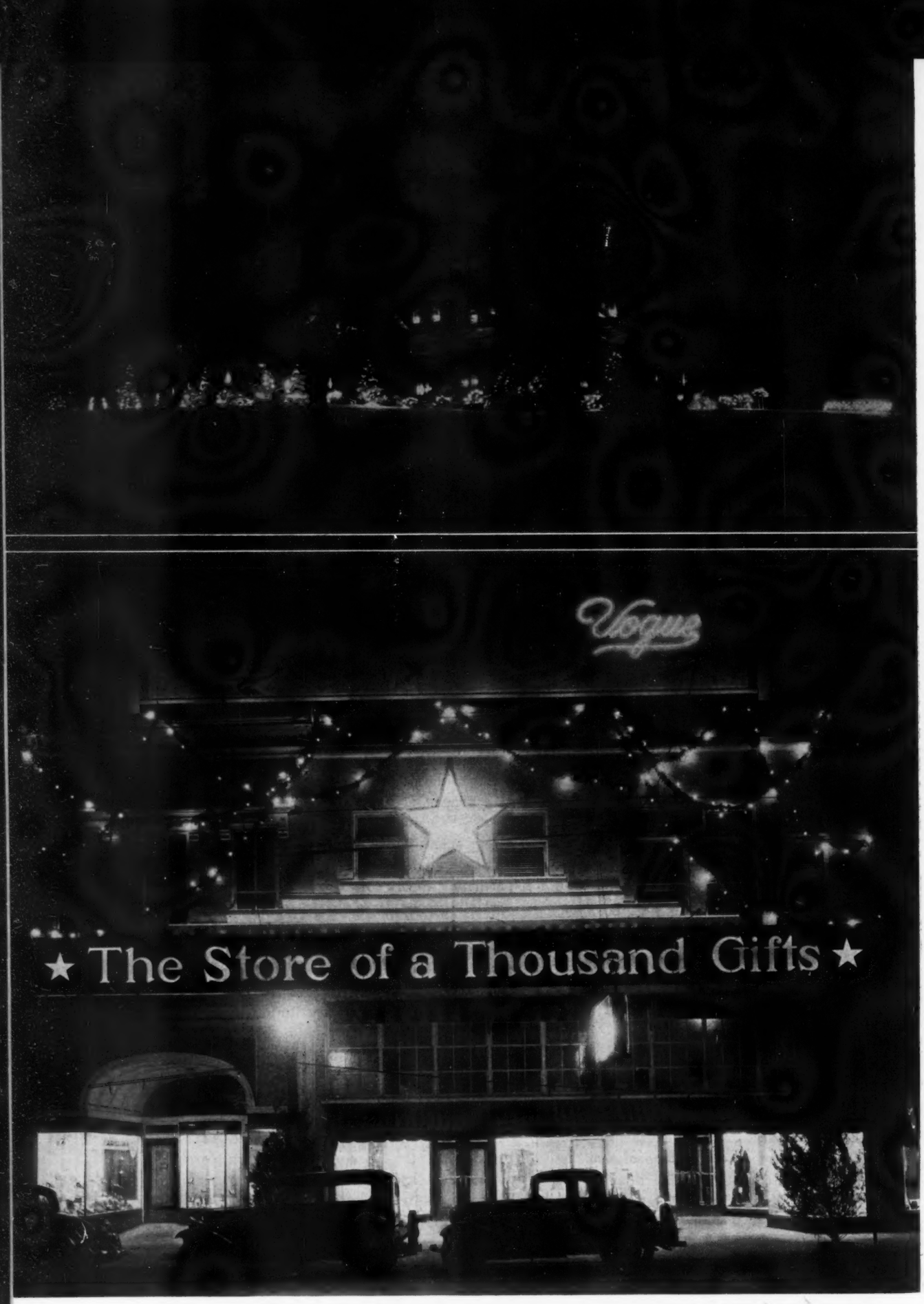
Just now the primary need of utilities is an intensive development of the markets. This required decentralized management, an intimate knowledge of local markets and the application of sound policies and plans for selling. Manpower, funds, co-operative effort, salesmanship and, above all, time to develop and put into effect marketing programs are tools to use to solve the problems of the business in intensifying the service and reducing the cost to the public.

IN THIS scenery the advent of the new federal agencies can make or mar the industry. If they attempt to control the industry on a generalized or centralized basis or endeavor to put into effect their preconceived ideas of management irreparable damage will be done to the industry. They should go slowly and develop adequate and competent staffs so that their approach to their tasks is based upon knowledge of present problems and a perspective that is broad enough to measure all values.

This utility business is a competitive business that ebbs and flows with the changes in national economic tides. A fair return today may be unfair tomorrow because of business cycles—industry pays when it is prosperous and defaults in times of trouble. Simple rates may be desirable, but the present rates are valid reflections of the economic factors that exist in each market. Many current policies may be based upon results to be obtained some years in the future. It should be recognized that the rapid shifts now occurring in the business are forced by economic facts and are not arbitrarily introduced by private management.

UTILITY regulatory bodies must consider these and a host of other economic factors in their regulatory yardsticks. They can attempt to develop some way of crediting efficient management and penalizing inefficient management. Fair regulation may lie more in scrutinizing operating costs and less in making transitory valuations or forcing the adoption of some particular theory of depreciation. Successful regulation should see that management is held responsible for results and at the same time that it is given freedom to produce these results. This new federal regulation violates this principle and this is one of the reasons why the legislation will be declared unconstitutional.

There is no necessity for highly centralized federal control of utilities or for federal regulation of management details to meet the present needs. Quite the opposite. The trend has been toward decentralization in ownership and management and the new federal laws came into being after the economic conditions forcing these moves had already come into operation. Thus, any move by the new federal bodies to go against this tide that is dictated by the new economic conditions in the business will fail and is not in the public interest. It can be shown clearly that the light and power service is a more local, a more intimate and a more individualistic business than ever before and the new federal regulation must adjust itself to these facts if it is to be successful. Why apply theory when facts are available?



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Holding Company Regulation

Outline of New Law—Details of Administration Now Developing—Financial, Structural and Operating Control Specified

By GEORGE C. MATHEWS*
Securities and Exchange Commission

THE Securities Act of 1933 requires, with certain exceptions, the registration with the commission of securities which are sold to the public through the mails or in interstate commerce. Many utility companies have filed registration statements, but, under the Securities Act, the commission has no jurisdiction to deny registration on the ground that an issue is not a reasonable addition to the capital structure of a company, or that the terms on which securities are offered are unfair to any class of investors. Its only function is to make sure that certain information regarding the security and the issuer is made available.

One of the first tasks which confronts the commission in its administration of the act is the handling of applications for orders excluding companies from the definitions of electric and gas utility companies, holding companies and subsidiary companies under Section 2, and for exemptions pursuant to the provisions of Sections 3(a) and 3(b). The statute contains somewhat unusual provisions with respect to these applications: If a company applies in good faith, it automatically receives the status applied for, until and unless the commission otherwise decides. This protects the applicant against the delay which is often complained of in the case of proceedings before administrative bodies. On the other hand, it is obviously desirable that the commission pass on such applications promptly so that they may be settled on the merits. This means that it must have before it adequate information to determine whether the conditions specified in the statute are present in the particular instance. Merely to invite companies to make application in any manner

Keystone

they may deem fit, and subsequently to obtain the information required, by hearing or by an interchange of correspondence, would obviously involve too much delay and might impose a real hardship on companies which go to the trouble of submitting information which the commission might deem irrelevant. On the other hand, there simply is not time to prepare a set of detailed questionnaires which would indicate precisely the information desired. The commission is, therefore, adopting a policy midway between that of considering each application on an entirely individual basis, without indicating in advance the general type of information desired, and that of specifying in detail the information to be given.

The most important provision for flexibility in administration of this legislation is contained in Section 3(d), which permits the commission, by rules and regulations, conditionally or unconditionally, to exempt classes of subsidiaries and affiliates from one or more provisions of the act. The standard by which the commission is to be guided in acting under this provision is merely the public interest and the protection of investors or consumers, subject to the express direction that the exemption must not be contrary to the purpose of the act.

Under the Securities Exchange Act of 1934 the commission is given extensive authority to regulate the business of dealing in securities, but here also its powers over the companies whose securities are traded in on the market are essentially limited to requiring the disclosure of adequate information for the guidance of investors.

In administering the new legislation, the commission will be charged with the duty of actually preventing certain practices in corporate finance and of regulating others, instead of merely compelling their disclosure to the public.

The general purpose of the Public Utility Act of 1935 is to give to the federal government power to regulate public utilities in certain respects in so far as state regulation has been found to be inadequate. It is intended to supplement but not to supersede state regulation. The Public Utility Act of 1935 is divided into two titles. Title I, which is termed the "Public Utility Holding Company Act of 1935," is that which I propose primarily to discuss. In general, it gives the Securities and Exchange Commission power to regulate the financial practices and corporate organization of public utility holding company systems.

*Abstract of address at Northwestern University, Oct. 14, 1935.

The first important respect in which a registered holding company and its subsidiaries are subjected to regulation is the issuance of securities. You will recall that, under the Securities Act of 1933, the commission is authorized merely to require adequate disclosure. Under Sections 6 and 7 of the Holding Company Act certain restrictions which will materially affect the nature of the securities and the financial practices of the issuer are imposed upon the issuance and sale of securities. Section 6 provides, in general, that no registered holding company or subsidiary thereof may issue a security unless it has filed with the commission a "declaration" regarding such security, and such "declaration" has been ordered effective by the commission. Certain exemptions are provided for short-term paper, securities of subsidiary companies issued to finance their utility operations and expressly approved by state commissions, securities of subsidiaries which are not holding companies, public utilities, or investment companies, and securities which are issued pursuant to warrants or conversion privileges already outstanding.

Subsection (c) imposes limitations on the methods by which the securities of holding companies are to be sold. They may not be sold from house to house and they may not be sold through officers or employees of subsidiary companies.

The procedure for filing a declaration with respect to a security issue and the standards which the commission is to follow in determining when to permit the declaration to become effective are set out in Section 7. The issuer must file with the commission a declaration, setting forth information about the issuer and the issue in manner and form to be prescribed by the commission. Although the commission's forms for use under this section have not yet been promulgated, they will probably be similar in many respects to those used under the Securities Act of 1933, except that certain additional information will have to be required to enable the commission to determine whether the security meets the standards which are provided in the statute.

Subsection (c) indicates the type of security as to which the commission may order a declaration to become effective. There are a number of alternative tests, one of which must be satisfied. Since the manner in which these tests are set out in the statute is rather confusing, I shall restate them in what may be a more logical order.

The primary principle is that holding companies should not normally issue no-par stock, preferred stock or unsecured debentures. Absence of par value has often served to conceal write-ups and mislead the investor as to the sums actually invested in the enterprise. When a member of the public purchases preferred stock or a bond, his natural assumption is that he is getting a security which is in a preferential position as to earnings. But in the case of holding companies, this is true only in a technical sense.

S.E.C. Controls

1. **Classification of utilities.**
2. **All security issues.**
3. **Territorial coverage and growth.**
4. **Property acquisitions and sales.**
5. **Interest, dividends, loans.**
6. **All intercompany transactions.**
7. **Accounting systems and method.**
8. **Service, sale and construction contracts.**
9. **Affiliation and holdings of management.**

In this address Commissioner Mathews gives his personal opinion and interpretation of the new utility legislation. It should be of great interest to all electrical men.

The preferred-stock holders and unsecured debenture holders of a holding company often have merely differing degrees of right to dividends received by the holding company on the common stock of operating companies. If the issuer is not a holding company, or if the security is issued for the purpose of financing its business as an operating utility, these objections lose their force, and the statute permits approval by the commission.

It is also recognized that, in the course of refinancing operations, mergers, reorganizations and similar financial readjustments, there will often, as a practical matter, be no choice but to issue securities of the general type already outstanding in the hands of investors. The commission is given the further power to disregard the limitations which I have just discussed if, in urgent cases, they would impose an unreasonable financial burden on the issuer, or if the issuance of the security was authorized before January 1, 1935. The commission may also permit the issuance of guaranties or assumptions of liability on other securities, and receiver's or trustee's certificates.

The security must not only be of a specified type, as indicated in subsection (c), but its relationship to the general corporate structure must meet certain standards which are set forth in subsection (d). It must be reasonably adapted to the general security structure of the company and the remainder of the holding company system. By this standard, general though it may be, it is apparently expected that the commission may prevent the issuance of securities which would only have to be eliminated in meeting the requirements of simplification of holding company structures contained in Section 11. Secondly, issuance of the security must not be permitted if it is not reasonably adapted to the earning power of the declarant.

In the bill as originally introduced the test imposed was that the security must bear a reasonable relation to the sums prudently invested in the system. The difficulty of making a finding as to the sums prudently invested must be apparent. State commissions have found it impossible to determine the amounts, in many cases. The test of earning power does, however, permit the commission to veto an issue which promises dividends or interest rates obviously beyond the power of the system to maintain with any reasonable assurance. In the third place, an issuance is not to be permitted if it is not necessary or appropriate to the economical and efficient operation of a business in which the applicant is lawfully engaged. Paragraph (4) gives the commission power to require that fees, commission and other remuneration involved in the issuance and sale and distribution of the security should be reasonable. This is obviously designed to afford protection against the bankers taking more than a reasonable share of the proceeds, and to insure against holding companies themselves milking their subsidiaries by excessive charges for financing. Paragraph (5) provides against excessive guaranties or assumptions of liability, and paragraph (6) gives the commission general power to reject terms and conditions which are unfair to the public.

The commission's jurisdiction extends not only to the issuance of new

securities, but also to the exercise of any privilege retained by the company to alter rights of the holders of an outstanding security. For example, at least one of the large holding companies has issued bonds convertible into stock at the option of the company. In exercising such an option, such a company would now have to file a declaration with the commission, and, as provided in Section 6(e), the commission could withhold approval if the change were found to be detrimental to the interests of investors.

The commission is given power, under subsection (f), to impose specific conditions which will prevent evasion of the purposes of this section after a declaration has become effective.

Supervises growth

If regulation of holding company systems is to be effective, the commission must obviously have power to supervise any further growth of the systems which are under its jurisdiction. The subject of acquisition of utility assets, security holdings or any other interest in any business is covered by Sections 9 and 10. Although the general policy of the act, as more particularly illustrated by the so-called "death sentence," is clearly against the uncontrolled expansion of holding company systems, there are bound to be many cases where the transfer of operating properties or security holdings as between systems will be essential to the consolidation and simplification which the act seeks to attain.

The commission's jurisdiction in this respect is established by Section 9(a), which subjects to the approval of the commission acquisitions on the part of registered holding companies or their subsidiaries of the assets of other companies, securities of other companies, or any interest in any other business.

Paragraph (2) of Section 9(a) requires such approval also in the case of acquisitions by companies which, although not registered holding companies or subsidiaries, are in a position to become holding companies by gradually building up control. You will note that, in order to come within the operation of Section 9(a) (2), the acquiring company must, after the acquisition, be an affiliate of two public utility or holding companies. The term "affiliate" is defined in Section 2(a) (11), but, for our present purposes, it includes only a company which controls 5 per cent of the voting power of the company in question.

Since it is not by its terms confined to registered holding companies and their subsidiaries, and consequently ineffective until such registration, Section 9(a) (2) is the one provision of the Holding Company Act which became practically effective immediately upon enactment. As the commission is not yet in a position to promulgate the necessary rules and regulations for enforcement of this provision, it has made use of its general exemptive power as to affiliates under Section 3(d), and has postponed the effect of Section 9(a) (2) until further notice, subject to the condition that acquisitions coming within its scope must be reported to the commission.

Certain exemptions from the necessity of commission approval of acquisitions are provided by Section 9. Acquisitions of utility assets by an operating company are exempt if expressly authorized by a state commission, and acquisitions of securities by operating companies so authorized are likewise exempt if the acquiring company and the other companies in the system are substantially confined in their business to a single state in which they are organized and provided, further, that the company whose securities are acquired is already an operating subsidiary of the acquiring company. Subsection (c) provides for the exemption of securities acquired primarily with a view to the investment of funds or in the ordinary course of business as distinct from major moves for the extension of control or the expansion of business.

The tests which the commission must impose in determining whether or not to approve an acquisition are set out in Section 10. These tests are not quite as specific as those in the case of security issues and will, of necessity, require that the commission exercise more particular judgments on the merits of individual cases. I will omit a detailed discussion of Section 10(a), which merely specifies the sort of information which the commission may require as a basis for action. In general, subsections (b) and (c) direct the commission not to authorize acquisitions which will unduly complicate the system, or which will be contrary to the obvious intent of the whole statute and to the particular policy set forth in Section 11, which deals with the simplification of holding company systems and their confinement to integrated systems. The commission is also authorized, by subsection (e), to scrutinize the reasonableness of the consideration to be paid and the various fees and commissions involved.

Reorganization forced

I come now to that aspect of federal regulation which has attracted the most widespread popular attention. I refer to the program for gradual reorganization of many of our holding company systems, with a view to regrouping the various units along lines of operating integration which are dictated by practical efficiency. The commission's duties in this respect are outlined in Section 11.

Section 11(a) directs the commission to make a study of the entire problem of eliminating undue complexities in holding company organizations. The action which the commission is to take in order to simplify holding company systems is specified in subsection (b). Under paragraph (1) of this subsection the commission is directed, as soon as practicable after January 1, 1938, to require each holding company to limit its operations to a single integrated system, subject to exceptions. The term "integrated public utility system" is carefully defined in Section 2(a) (29).

Thus, save in exceptional cases, it will eventually be impossible for the same interests to control public utility systems which are not part of the same geographically and economically integrated unit. The commission may, however, make exceptions in cases where it finds that retention of additional systems under the same control cannot be avoided without the loss of substantial economies, provided that additional systems so included are confined to a single area, and that the resulting holding company system which is permitted to continue will not be so large as to impair the advantages of localized management, efficient operation and effectiveness of regulation.

Holding company systems must be simplified not only with respect to their geographical distribution, but also as regards their corporate organization. Under paragraph (2) subsection (b) the commission is directed, also after January 1, 1938, to bring about the simplification of these structures so as

[*Continued on page 82*]

Cable Halves Cost of Service Extensions

Unit Cost Lowered From 30 to 15 Cents per Foot With Cable Laid and Covered by Plow

Here is a new way to serve rural and suburban customers. It is claimed to be lower in cost and to give better service. It involves underground construction with new equipment. These are the kind of developments that make for industry progress.

By G. S. VAN ANTWERP
General Superintendent Transmission and Distribution, Suburban Division, Philadelphia Electric Company.

RURAL and suburban homes that are not being served electrically, even though in territory where service is available, are still off the lines for reasons, one of which may be the cost of a service extension from the highway to the meter location. Many rural houses are 300 to 1,000 ft. from the highway and voltage regulation demands primary service if the load is worth while having service at all. The Philadelphia Electric Company is trying out a cable scheme which costs half as much as, or even less than, an overhead extension at the uniform charge of 30 cents per foot for all after the first 100 ft. free. This was the same whether on the highway or private grounds because of close similarity of cost factors.

Previously the company had never encouraged underground construction for this type of load. The specifications were based on the assumption that if the load or conditions warranted underground it should be put in the best way, such as iron pipe conduit, oversize conductors for future load, and overinsulated to avoid service outages. This, with pull boxes, handholes, potheads, protective devices and transformer vaults, made the cost for a small load prohibitive.

Obviously, then, if a simple and cheaper method of underground construction could be devised it would tend to solve the greater portion of the problem. In such a modified design factors which were not present in the old days could be considered:

1. Grounded primary neutral.
2. Small size solid conductors.
3. Better and more workable insulation.
4. More adequate lightning protection.
5. Concentric cable construction.
6. Elimination of conduit and handholes.
7. Desire to develop an economic workable scheme for small loads.

With the foregoing as a background, a cable having the following specifications was developed: Two conductor No. 8 concentric, No. 8 solid soft tinned copper, $\frac{7}{64}$-in. insulation, marker, tape, concentric tinned copper wires, 3,000 volts.

Prices were obtained from several manufacturers for such cable, with the understanding that it was to be laid in the ground by either trenching or plowing and would be subject to submersion in water at low points. The insulation must also be of such a nature that it could be terminated without potheads or spliced without hot compound. Based on the prices received, it was estimated that the cable could be purchased and installed for 10 cents per foot plus 5 cents per foot for plowing or digging, making a total cost of 15 cents per foot.

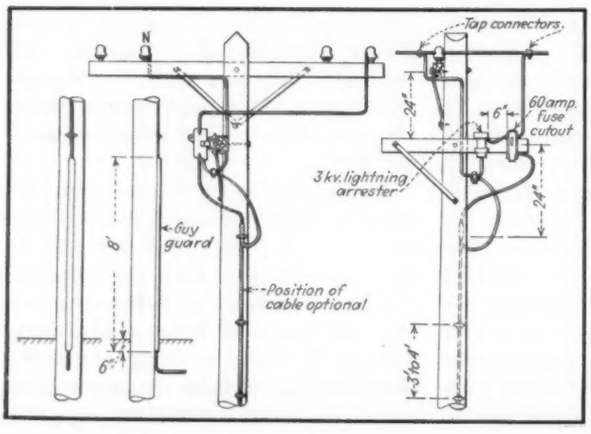


Fig. 1—Terminal pole for cable tap to line for rural distribution
Solid wire for taps using connectors. Lightning arrester and fuse cutout may be mounted on primary arm if it is not supporting more than two wires.

Fig. 2—Cable in dug trench or laid with cable plow

The company owns, installs and maintains the portion of cable in the highway where this cost is equivalent to the cost of the first span that it must supply on the aerial line. This is the average case. Extraordinary paving and permit costs must be paid by the customer.

Each cable tap is provided with a fuse cutout, which serves as a disconnecting device and protects the trunk line from cable or transformer failure. The most severe lightning stress on the cable comes at the terminal pole, where the lightning arrester is placed (Fig. 1).

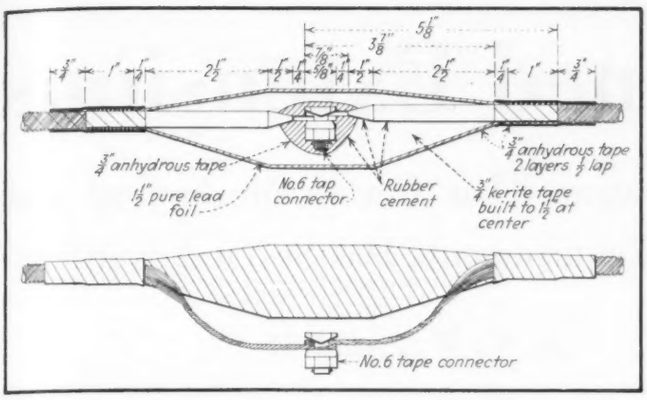


Fig. 3—Splice laid in ground without supplementary protection

Instructions—Overlap cables 2 in. and wrap a collar of anhydrous tape around each for 6 in. from end. Lay back concentric strands and remove factory tape, exposing insulation for 4½ in. Cut off ¾ in. of conductor and insulation. Finish as indicated above.

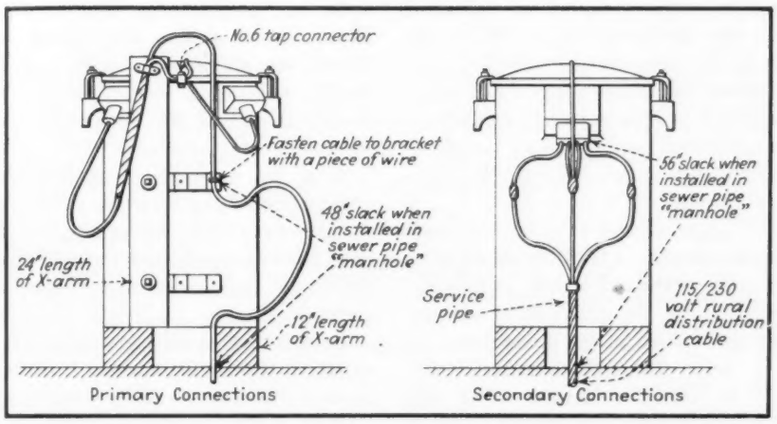

No.6 tap connector
Fasten cable to bracket with a piece of wire
48" slack when installed in sewer pipe "manhole"
24" length of X-arm
12" length of X-arm
Primary Connections
56" slack when installed in sewer pipe "manhole"
Service pipe
115/230 volt rural distribution cable
Secondary Connections

Fig. 5—Ground installation of transformer, about which is culvert tile and cover to simulate manhole

(a) Instructions—Remove coverings, exposing 2 in. of bare rubber and V.C. insulations. Cover connector with anhydrous tape. Apply rubber cement from braid to braid and allow to dry. Apply rubber tape to ¼ in. minimum thickness. Apply two layers half-lap of anhydrous tape overlapping braid and tape 1 in.

The cable is either laid in a trench, approximately 12 in. deep, or plowed in with a cable-laying plow. In the event that both electric and telephone services are to be underground, both cables are placed at the opposite edges of the same ditch or each cable is separately plowed in.

Splices (Fig. 3) are placed in the ground without additional protection.

It was originally planned to mount transformers on a small pole near the customers' service outlet. This meant bringing primary cable up the pole to the transformer. The secondary service could be run either aerial or underground from the transformer to the house by the contractor. The company furnished and installed the transformer (Fig. 4) at its expense.

To avoid objection to the appearance of such a transformer installation a scheme of placing the transformer in a cement or terra cotta pipe was devised (Fig. 5). The pipe was fitted with a concrete cover so that it could be placed at a convenient location, even at the end of a rock garden. The bell end of the pipe was set in the earth a few inches, just enough to hold it solid. No foundation was required.

Wood blocks were placed on the ground within the pipe to keep the transformer, usually a standard 3- or 5-kva. aerial distribution type, from contact with the earth and to prevent the tank from rusting too fast. The transformer was placed on the blocks,

Fig. 6—Transformer ready for installation in sewer pipe "manhole"

Cover at right, cable trench in foreground.

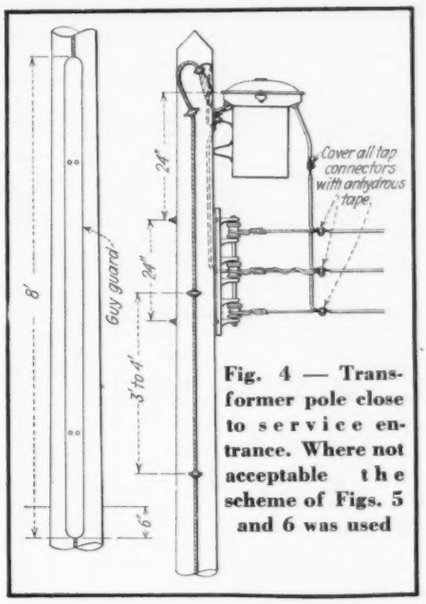


Fig. 4 — Transformer pole close to service entrance. Where not acceptable the scheme of Figs. 5 and 6 was used

primary and secondary cables connected and well insulated and the cover placed over the open pipe end. The cover rested on legs so that a small opening was provided for air circulation.

These pipes have a diameter of 30 in. and are 36 in. long. They weigh 1,100 lb. and the cover about 200 lb., thus making it unlikely that they will be disturbed or carried away. Such piping can usually be purchased locally, while the covers are flat concrete disks that can be made at odd times. Either the pole mounting or the pipe job will be installed for the same price to the customer—$20.

Conclusion

This scheme is yet in the experimental stage. In the meantime, the customer can get a private property supply line having the following advantages:

1. *Cost reduction* of two-thirds to one-half that of an aerial line.
2. *Longer life* than the wood poles.
3. *Reduced maintenance* (only accidental breaks and spot failures to care for).
4. *Elimination of shade tree cutting.*
5. *Concealed location,* avoiding disfiguration of property.

His answer has been a general acceptance of this type of installation for locations not all rural and customers not exactly farmers. Just how much further this cable work can be economically extended toward the substation is under study, as larger sizes and more voltages are involved. We at least have made a start and are considering other possibilities.

Planned Extensions

Simple Routine That Covers Mechanical and Electrical Requirements Has Seven Advantages

By W. W. PALMER

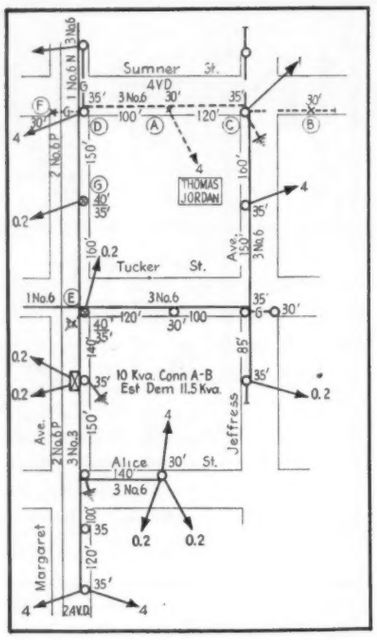


Fig. 1—Layout serves for cost estimates and as construction guide

FIELD planning is often sufficient for the mechanical design of new-load extensions, which must be checked, however, for electrical and economic balance if good service is to be provided at low cost. To provide this check within a few hours after service is requested the following routine has been in successful operation for several years:

Upon receiving notice of a service request which requires line changes the distribution engineer tentatively plans the extension from his distribution maps, checks the layout in the field, where he makes a sketch of the entire secondary system to which the new load will be connected. If the distribution maps are incomplete he gathers such additional information as will be required for a sketch similar to that in Fig. 1. In the office this sketch is quickly drawn on cross-section paper, using only a celluloid triangle, drilled for symbols, and a set of colored "ditto" pencils. While the sketch is not to scale, it is proportional and 100 ft. to the inch or larger.

Symbols and colors are standardized to minimize explanatory notes. Two- and three-wire services are represented by single- and double-barbed arrows, respectively, and the field-estimated individual demands in kw. are shown at each service arrow point. Crosses represent proposed poles and broken lines other construction necessary. Voltage drops are based on diversity factor tables and calculated on a special slide rule. The estimated drops are shown on the sketch at the ends of the lines and are checked with recording voltmeters after the work is completed. Transformer loading is checked with a hot-wire ammeter bridging one open transformer primary cutout.

The material list (Fig. 2) is made from the sketch. Costs are taken from a similar standard sheet completely filled out by the purchasing department and issued at irregular intervals when price changes are sufficiently large to affect estimates. The unit labor costs are also taken from a standard sheet, which is corrected from time to time to agree with actual costs. All calculations are made on portable calculating machines. Note that the items on Fig. 2 are already grouped under the proper accounting classifications so that the totals may be transferred to Fig. 3, on which any additional classifications and the overhead accounts are added. Material and labor to be retired from capital and cost of removal are also entered on this form.

On the reverse side of Fig. 3 is Fig. 4, which becomes sheet 1 of the completed work order. This form gives a description of the work, net cost and financial benefits to be expected. These three sheets are typed and bound to duplicate copies of the sketch, submitted for approval, and finally issued to the construction department for execution.

After the work has been completed and inspected the foreman returns his sketch, on which deviations, if any, have been marked, and the permanent drawings are corrected from the sketch.

To assure that all customers will be extended the same courtesy in line extension allowance and to stimulate the use of major appliances 200 ft. of new line is offered free for any "equivalent" customer located beyond present service lines. Light, refrigerator, range, water heater and water pump each qualifies as one equivalent customer. Thus, it is possible for one

ESTIMATE SPECIFICATION

Load: Range, Refrigerator and Lights. 12821
Customer: Thomas Jordan — Made by W.W.Palmer
Location: 1326 Sumner Ave. — Date 5-2-35

Quantity	MATERIAL	Rate	Amt.
	POLES, TOWERS, and FIXTURES		
3	30 Ft. Creo. Pine Poles—Class 3	6.55	19 65
2	40 Ft. Creo. Pine Poles—Class 3	10.95	21 70
	Ft. Creo. Pine Poles—Class		
	Ft. Creo. Pine Poles—Class		
	Ft. Creo. Pine Poles—Class		
5	Pole Tags	.03	15
2	Single 6 P. Arms, Compt.	1.50	3 00
	Single 6 P. 15° Arms, Compt.		
	Iron Brackets Arms		
	Sets, Double 6 P. Arms, Compt.		
	Sets, Double 6 P. 15° Arms, Compt.		
	Sets, Double Heavy Arms, Compt.		
5	Sec. Racks (3 spool)	1.20	6 00
	Sec. Racks		
	Insulated Clevises		
	Insulated Clevises		
	Spreader Brackets		
	End Pins, Compt.		
	18 x ¾ Space Bolts		
	¾" Machine Bolts		
	⅝" x 4" Lag Screws		
	Sq. Washers		
	Large Clevises		
	Eye Nuts		
	¾" Thimbles		
	1¾" x 9" Locust Pins		
	Cross Arm Straps		
	Sec. Rack D. E. Straps		
	Guard Pins—Item No.		
1	Ft. Anchor, Compt.	4.10	4 10
2	Head Guys, Compt.	6.15	12 30
	Cross Arm Guys, Compt.		
2	Guy Wire Protectors—8'	1.30	2 60
	TOTAL MATERIAL		69 50
	TRUCK MILEAGE & MISC.		2 50
	LABOR: GANG: HRS.		40 00
	TOTAL		112 00
	OVERHEAD CONDUCTORS		
47	Lbs. (484 Ft.) No. 6 W Wire	.19	8 93
20	Lbs. (242 Ft.) No. 6 B Wire	.15	3 00
	Lbs. Merchant Solder		
	Lbs. Friction Tape		
2	Grounds, Compt.	3.00	6 00
	Copper Sleeves		
	Clamps		
	Connector No. 4	.15	30
	Connector No.		

Quantity	MATERIAL	Rate	Amt.
	Pin Insulator—Item No.		
	Pin Insulator—White Porcelain		
	Pin Insulator—Item No.		
	Strain Insulator—Item No.		
	Strain Insulator—Item No.		
	Thread Thru Insulators		
	Ky. Arresters		
	Neutral Plug Cutouts		
2	60 Amp. Expulsion Cutouts—Item No. 5.00	10	00
	Amp. Dropout Fuses—Item No.		
	Amp. Fuse Links		
	TOTAL MATERIAL	28	83
	TRUCK MILEAGE & MISC.	1	17
	LABOR: GANG HRS.	6	00
	TOTAL	36	00
	GRAND TOTAL LABOR	46	00
	GRAND TOTAL MATERIAL	102	00
	GRAND TOTAL	148	00
	SERVICES		
39	Lbs. (400 Ft.) No. 6 W Wire .19	7	41
	Lbs. (Ft.) No. Wire		
3	Thread Thru Insulators .15		45
6	Connector No. 4 .15		90
1	Meter Socket 1.75	1	75
	LABOR: GANG HRS.	2	49
	TOTAL LABOR AND MATERIAL	13	00
	LINE TRANSFORMERS NONE		
	K.W. Transformers		
	K.W. Transformers		
	K.W. Transformers		
	LABOR: GANG HRS.		
	TOTAL LABOR AND MATERIAL		
	STREET LIGHTING EQUIP.		
	NONE		

Fig. 2 — Estimates made from layout and periodically revised unit costs

FIXED CAPITAL ADDITIONS — WORK ORDER NO. 12821

Account No.	ITEM	Labor	Material	Truck Mileage	Amount
2170	Distribution Line Land and Right of Way Surveys				
2710	Poles, Towers and Fixtures	40.00	69.50	2.50	112.00
2720	Overhead Conductors	6.00	28.83	1.17	36.00
2020	Engineering and Superintendence				10.36
					158.36
2035	General Administration				9.50
2031	Injuries and Damages During Construction				1.58
2033	Taxes During Construction				1.58
2034	Interest During Construction				4.98
	Total Estimated Cost				176.00

PROPERTY RETIREMENT

Account No.	ITEM	Quantity	Unit Cost	Original Cost	Estimated Salvage
2710	35' Untreated white cedar poles	2	5.25	10.50	--
	6-pin Crossarms, complete	2	1.50	3.00	--
	Secondary racks, complete	2	1.20	2.40	--
	Plug type transformer cutouts	2	1.35	2.70	--
	Original labor for installing			12.00	
				30.60	
2020	Engineering and Supt.			2.14	
				32.74	
2035	General Administration			1.96	
2031	Injuries & Damages			.33	
2033	Taxes during Const.			.33	
2034	Interest during Const.			1.64	
			Total Property Retired	$37.00	0.0

COST OF RETIREMENT

Account No.	ITEM	Amount
2021	Cost of Removal	$ 8.00

TRANSFORMER DATA

Transf. Set at—	(A)	(B)	(C)	Transf. Removed From (D)	(E)	(F)
KVA.				KVA.		
Mfg.				Mfg.		
Serial No.				Serial No.		
Company No.				Company No.		

Fig. 3—Recapitulation of costs for accounting department

CUSTOMER'S EXTENSION WORK ORDER

Company _____ General Office P. R. No. 14011

Location 1326 Sumner Ave. General Office P. R. No. 15008

Work Order No. 7000

Work to be Performed by { Contractor _____ / Operating Dept. U. D. (Name Above) } Local Office Est. No. 12821

Amount of Appropriation Requested $ 176.00 Classification Electric Distribution

General Description of Work:
Extend 3-wire secondary 220' to serve new customer.

Detail Description of Work:

In tall 30' creosoted pine poles at A, D and F.
Install 40' creosoted pine poles at E and G.
String 2 #6 W.P. and 1 #6 B. neutral secondary from D to C (220').
Install head guys at FD and CB.
Install anchor and guard at B.
Install grounds at C and E.
Remove 2 - 35' decayed untreated poles at E and G.

Customer is within 200' allowance.
Ratio of cost to annual revenue 2.11 to 1.

TOTAL ESTIMATED COST OF JOB:		ADDITIONAL LOAD:		STATE OF _____
Cost of Construction	$ 176.00	Lighting	1	County _____
Meter, Transformer, Services and Street Lights Cost	$ 27.00	Ranges	1	City _____
Cost of Retirement	$ 8.00	Refrigerators	1	School Dist. _____
Total	$ 211.00	Water Heaters	--	Trans. Cap. Added --
Salvage Credits	$ ---	Street Lights	--	Pole Line Miles Added --
Net Cost of Job	$ 211.00	Power -- H.P.		
Amount Paid by Customer	$ ---	Est. Additional Annual Rev. $ 100.00		
Net Cost to Company	$ 211.00	Refund Contract Number		

Fig. 4—Work order acquaints construction crew with costs involved

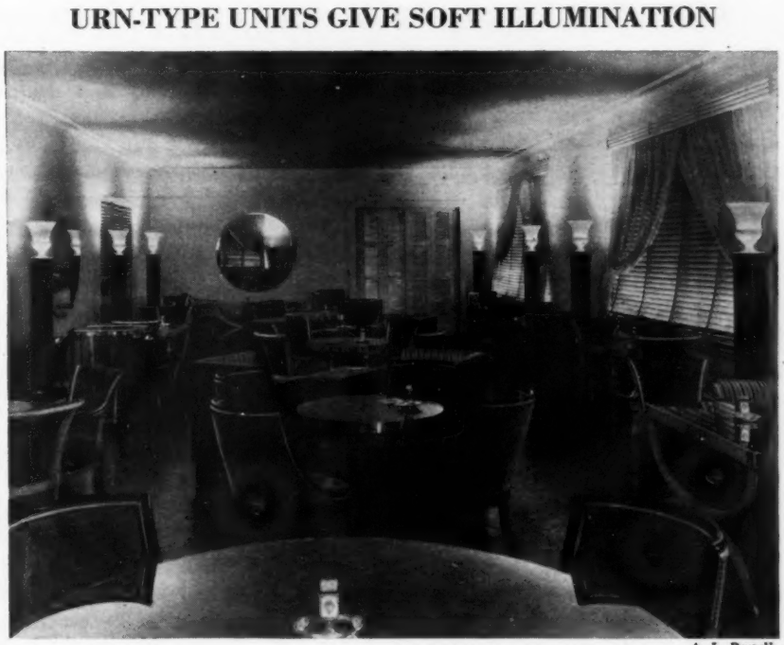
customer to acquire the service from 1,000 ft. of new line free without shouldering any of the line cost providing he uses all of these services. For standardization of estimated revenues the expectation from each type of service is set up from time to time and used uniformly for extension estimates. This ratio of line costs to anticipated revenue and the feet of line per equivalent customer gives the executive a double check for approving the extension, whether urban or rural.

In case a prospective customer is beyond the 200-ft. allowance his application is not refused, but he is advised that the expected revenue will not justify so large an investment on the company's part, and if he wishes the service sufficiently to make a cash deposit covering the excess footage on a pro rata basis the company will sign a refunding contract agreeing to return $25 for each equivalent customer connected (without additional extension) within five years.

Construction men can usually be relied upon for good mechanical construction, but are not as dependable on economics and voltage regulation. On the other hand, the pressure to make sales quotas often leaves new customers with the impression that they will be served quickly. This routine provides a quick engineering and economic check which improves the company's position as follows:

1. Eliminates personal trading with prospective customers.
2. Stimulates load building, but not at excessive line expense.
3. Utilizes the best parts of field and office design without unnecessary delays.
4. Assures good regulation to new customers without lowering the quality of service to present customers.
5. Avoids hasty and inefficient construction.
6. Sets a definite and fair figure for material and labor charges.
7. Educates the employees and public on actual costs of lines.

URN-TYPE UNITS GIVE SOFT ILLUMINATION



A. L. Powell

Modern lighting is co-ordinated with the architecture and decorations in the Empire Room of the Hotel Biltmore, New York, by the use of indirect bowls of period design. The use of indirect lighting eliminates shadows and results in an effect conducive to relaxation.

Laundry Equipment for Building Load

Methods and Experience of 19 Power Companies—Leaders Last Year in Local Building With Clothes Washers and Ironers—Status of This Equipment in the Sales Program

AT A CONSERVATIVE estimate, there are 200,000 electric ironing machines in use in the homes of America and 10,250,000 electric clothes washers. Total sales last year, as reported by manufacturers, were 116,069 ironers and 1,121,137 washers. Of these, about 86 per cent of the clothes washers and 68 per cent of the ironers were sold by dealers. About 10 per cent of the washers sold are for replacement.

It was not so many years ago that the clothes washer was the favorite merchandise of the power companies. It had just displaced the vacuum cleaner as the fad among utility sales departments. Since then interest has waned as more attention was given to refrigeration. In fact, in the analysis of power merchandising activities published in ELECTRICAL WORLD on March 2 of this year, out of 74 power systems actively engaged in merchandising domestic appliances 27 reported no clothes washer sales whatever. All but seven reported sales of ironing machines. But the total sales reported was 270,883 clothes washers, against 15,842 ironing machines, these totals embracing some 100 power companies for the year 1934. These companies sold 90,797 more washers and 6,270 more ironers in 1934 than in 1933.

The contrast between these totals on ironers and clothes washers is something for consideration. The washer consumes about 20 kw.-hr. a year. Not much—but, say, a matter of 205,000,000 kw.-hr. a year to the industry. And if for no other reason, it is worth the selling because it furnishes a vital service to the home. It banishes a labor of dire drudgery and the more families that are enjoying the benefits of this appliance the closer the bond between the power company and its customers.

But the ironing machine also offers a vital service. It completes the service of the washer and relieves the house-

Laundry Equipment Sales by Nineteen Power Companies

A comparative study of methods and results—embracing local conditions, methods used and progress made through company and dealer sales in recent years

TABLE I

Company	Total Domestic Consumers Dec. 31, 1934	Av. Total Dom. Consumption June 30, 1935	Av. Revenue from Dom. Cons. 1934	Av. Cost per Kw.-Hr. to Dom. Customer-Cents	Av. Sales of Appl. per Cons. 1934	Present Sat. of Ironing Machine %	Ironing Mach. Sat. Compauy Employees %	Total Ironing Machines Sold by Power Company						Total Ironing Machines Sold by Dealers—Est.			% of Dealer Sales for 18 Months
								6 Mos. 1935	1934	1933	1932	1931	1930	6 Mos. 1935	1934	1933	
A	764,613	766	$33.69	4.38	$4.46	5	.....	486	1,261	598	610	504	768	.....	.....	.....	.....
B	713,621	511	34.42	6.74	3.47	5	.....	592	2,027	689	598	848	1,657	.....	3,000	1,000	.....
C	533,123	675	34.30	5.08	3.75	2	9	237	685	259	316	379	500	.....	1,370	518	.....
D	316,008	626	35.48	5.67	3.09	.....	.....	95	372	235	176	135	231	.....	.....	.....	.....
E	300,690	609	33.96	5.58	2.98	.....	20	104	266	348	256	319	347	1,250	1,340	1,090	87
F	295,793	530	35.75	6.75	5.09	.....	.....	211	212	189	112	131	151	.....	.....	.....	.....
G	279,611	754	34.54	4.58	3.09	42	44	365	865	626	.....	.....	.....	1,825	7,200	5,200	88
H	278,357	665	27.97	4.21	6.10	.....	.....	361	662	279	340	332	440	.....	.....	.....	.....
I	232,403	643	37.99	5.91	3.37	10	.....	300	609	442	290	255	334	.....	.....	.....	.....
J	197,706	707	30.05	4.25	2.56	.....	.....	57	103	144	154	202	.....	.....	.....	.....	.....
K	156,633	482	34.73	7.21	3.80	2	5	141	514	338	287	384	241	55	160	120	25
L	155,781	664	31.21	4.70	8.00	3	36	427	621	225	175	148	258	250	400	150	38
M	147,371	704	33.60	4.77	7.95	3	.....	162	493	212	94	370	280	.....	250	100	.....
N	120,033	888	35.53	4.00	20.40	1	.....	40	314	40	31	54	.....	125	200	150	48
O	100,793	502	29.99	5.97	6.40	15	.....	85	209	309	278	273	590	.....	.....	.....	.....
P	93,000	[B]732	.....	.....	.....	.....	10	448	642	840	171	95	.....	900	650	.....	59
Q	67,831	647	38.26	5.91	17.15	6	9	122	543	171	119	240	216	50	600	300	49
R	49,588	587	35.41	6.03	15.15	1	1	42	242	82	.....	.....	.....	.....	.....	.....	.....
S	43,482	1,236	37.00	2.99	8.08	5	15	157	266	84	71	646	582	104	99	69	37
Total	4,846,437	[A]677	[A]$34.10	[C]5.03	[A]$6.94	.....	.....	4,432	10,906	6,110	4,078	5,375	6,595	4,559	15,269	8,697	.....

[A]Straight line average. [B]This figure not included in average. [C]Weighted average.

TABLE II

Company	Present Sat. of Clothes Washers %	Clothes Washer Sat. Co. Employees %	Total Clothes Washers Sold by Power Company						Total Clothes Washers Sold by Dealers—Est.			% of Dealer Sales for 18 Months	No. Selling Laundry Equipment Av. 1934		Compensation of Salesmen
			6 Mos. 1935	1934	1933	1932	1931	1930	6 Mos. 1935	1934	1933		Salesmen	Service Women	
A	40	.....	1,654	4,149	3,803	1,659	2,236	2,626	.....	.....	.....	.....	50	10	Straight com. 15%
B	46	.....	3,045	8,279	4,869	3,178	3,462	5,821	.....	30,000	18,000	.....	145	12	Com. 15% with guarantee $65.20 monthly
C	40	65	1,472	3,516	1,799	1,699	2,131	5,119	.....	87,900	44,975	.....	181	24	Salary and com. averaging 11% of net sales plus variable bonus
D	.....	.....	638	2,013	1,571	1,363	1,832	1,187	.....	.....	.....	.....	28	8	Com. 10% with $15 minimum per week
E	.....	95	466	1,078	1,659	815	1,343	2,395	8,400	10,822	9,975	92	17	16	Salary $50 a mo. plus com. 14% over $300 monthly sales
F	.....	.....	1,035	1,921	1,539	1,963	4,065	6,947	6,725	.....	.....	.....	201	21	Salary $55 plus com. of $3.20 to $5.20 on washers and $2.20 on ironers
G	61	68	1,136	2,714	2,697	.....	.....	.....	12,720	22,600	22,000	90	15	.....	Handled on resale plan. Manufacturer provides and pays men
H	.....	.....	1,578	3,040	1,824	1,376	1,814	2,936	.....	.....	.....	.....	122	.....	Straight com. 12%
I	71	.....	1,615	2,049	2,059	1,019	799	1,322	.....	.....	.....	.....	61	.....	Salary plus com.
J	70	.....	726	1,594	2,256	1,966	2,274	1,898	.....	.....	.....	.....	6	.....	Straight com. 10% to 15% varying with price and source of lead
K	35	66	842	2,139	2,384	2,573	3,387	2,794	700	1,489	1,145	42	57	3	Some straight com. 15%, some salary $15 to $25 a week, plus com. 6 to 8%
L	36	90	1,066	1,979	1,085	848	803	1,268	1,000	1,000	750	40	60	8	Straight com. 10% to 12% plus small monthly bonus over quota
M	80	.....	663	1,378	1,009	996	1,870	2,541	.....	8,000	6,000	.....	115	3	Monthly guarantee $50 plus com. 15% on cash sales or 25% on higher down payments, plus 14% on charge or other time sales
N	10	.....	350	911	237	233	295	.....	1,600	2,500	1,500	67	[D]117	.....	Straight com. 10%, plus load bonus 50 cents on washers and $1 on ironer. Additional bonus in campaigns
O	48	.....	369	1,013	1,138	720	826	1,412	.....	.....	.....	.....	25	.....	Salary $45 a month plus 10% com.
P	.....	20	463	918	1,287	1,651	842	685	1,850	3,700	.....	80	35	.....	Salary $65 a month plus com. 7½% on sales plus campaign bonus sometimes
Q	48	81	616	1,156	766	597	576	863	450	1,500	900	52	65	5	Com. 15% with drawing account $55 a month
R	62	90	530	1,357	1,352	.....	.....	.....	.....	.....	.....	.....	60	.....	Straight commission
S	70	85	495	1,050	665	248	632	2,264	1,820	2,475	1,275	73	29	10	Av. salary $125 plus com. 75 cents per washer and $1 per ironer
Total	.....	.....	18,759	42,254	33,999	22,904	29,187	42,078	35,265	171,986	106,820	.....	.....	.....	

[D]Most home laundry sales by special crew from five to twelve men working in city.

work of another burden no less onerous and more time consuming. Also, it consumes 200 kw.-hr. a year on the average. It is a real load builder. Why, then, are so few being sold?

To get a close-up of how these two pieces of laundry equipment are being merchandised today by power companies that rate high as load builders, the methods in use in nineteen systems are presented in the accompanying tables. These companies were among the twenty showing the largest sales of clothes washers and ironers in the analysis of the 1934 merchandising activities of 100 utilities, already referred to. In this comparison, laundry equipment sales of these nineteen companies are listed, with their estimates of dealer sales and the important factors reflecting the local conditions under which they are selling.

These nineteen companies operate in communities varying in size from 764,613 to 43,482 domestic consumers. The average annual domestic consumption on these properties runs from highs of 1,236 in the Northwest, 888 in the Southeast and 766 in the Midwest to lows of 511 and 482 in the Northeast and 502 in the far West. Average annual revenue per domestic consumer varies from highs of $38.26 and $37.99 in the Midwest and $37 on the Coast to lows of $30.05 and $27.97 in the Mississippi Valley and $29.99 in the far West. The average yearly appliance sales per consumer by these companies shows highs of $20.40 in the Southeast, $17.15 in the Northeast and $15.15 on the Coast to lows of $3.09, $2.98 and $2.56 in the Midwest. The average cost of residence service to the consumer ranges from 7.2 and 6.7 to 4 and 3 cents per kilowatt-hour. It is the usual picture of diverse conditions, the amazing contrast that appears in the comparison of the merchandising records of almost any group of power companies today.

These nineteen utilities have sold 37,496 ironing machines in the past 5½ years and 189,184 washers. And the striking thing about this is the fact that only one ironer was sold for about five washers, despite its greater value to the utility and the greater number of prospects among the families which already wash their clothes electrically. And one wonders why.

The national saturation of clothes washers was 46 per cent at the end of 1934. The national saturation of the ironer was only 4.4 per cent. The ironer is a well-proven device. It is a natural next buy wherever a washer is at work. Why are so few sold? There can only be one answer. It is harder to sell. It is newer, not so often seen and not so well understood. It requires careful demonstration and home service follow-up, because results depend upon the proficiency of the woman who uses it. So it is harder to sell and the industry has allowed itself to be bluffed by that and let the ironer lag along, despite the valuable load it offers and the great need for that load right now.

The saturation figures shown for the nineteen companies listed here reflect the condition. One company reports ironing machines in use by 42 per cent of its domestic consumers—a splendid record for this appliance—with the rest mostly from 6 to 1 per cent. Against this the same companies have clothes washer saturations showing highs of 80, 71, 70 and 62 and lows of 35 and 10 per cent. Of these nineteen companies, seven do not know what their ironer saturation is, six lack data on washing machines and ten have not checked up the saturation of either appliance among their own employees. This is just more evidence

TABLE III

Company	How Do You Set Up Territory?	Do Same Salesmen Sell Other Appliances?	Do You Finance?	Maximum Time	How Extensive Is Promotion?	Dealer Co-operation
A	City divided 15 districts—7,972 customers per salesman	Some times	Yes	19 months	Pushed intensively door to door, part of regular program	Finance, little contact with dealers
B	Open territory in districts—Av. 5,000 dom. meters per man, with yearly quota 72 washers, 36 ironers	[E]Yes	Yes	18 months	Extensive newspaper adv. Demonstration, trial. Monthly and quarterly prizes. Bonus for employee leads	Through local league only
C	Based on purchasing power of territory	Yes	Yes	[H]18 months	Intensive regular adv. canvass and demonstration	Through local association only
D	Each salesman has territory. Campaign quotas for districts	Yes	Yes	18 months	Newspaper adv., truck posters, car cards, radio, displays. Spent $4,573, shared with manufacturers	Adv. support and counsel, sales help, meetings, demonstrations
E	No campaigns or quotas	No	Yes	12 months	None	Co-operative adv.
F	Based on territory	Yes	Yes	12 months	Newspaper and mail adv. campaigns. No separate appropriation	Adv. features dealers, sales training
G	Work out of district shops	No	Yes	18 months	Resale operation by manufacturers	None
H	No assigned territory. Quotas only in campaigns	No	Yes	Washers 18 mos. Ironers 24 mos.	Two campaigns yearly, with continuous selling effort. No separate promotion	None except Economy Purchase Plan
I	Three divisions with quotas divided among salesmen	Yes	Yes	18 months	Limited promotion—some newspaper adv.	Urge dealers to tie in with company advertising
J	No territories or quotas set up	No	Yes	18 months	Principally direct merchandising, newspaper adv., costing $5,000 a year	Co-operate in shows, exhibits and lectures
K	Salesmen cover from 1,000 to 2,500 meters	Yes	Yes	18 months	Year round selling, with balanced merchandising plan	Adv. features dealers. Dealer can act as co. salesman. Merchandising aids
L	Open territory	No	Yes	18 months	Continuous selling, with intensive campaigns. No separate appropriation	Educational adv. only
M	Sold by junior salesmen with protected territory	Yes	Yes	18 months	Direct mail adv., floor and home demonstrations. Spend $6,000, mostly on ironers	Adv. supports dealers, home demonstrations, sales training
N	Based on character of territory	[F]Yes	Yes	24 months	Campaigns three or four yearly from four to eight weeks, supported by limited newspaper adv. Little promotion outside city	None
O	Based on character of territory	Yes	Yes	15 months	Spring and fall campaigns 60 days, canvassing newspaper adv., radio, bonus for employee leads	Support through local associations, displays, demonstrations
P	Truck crews of seven men cover 19,000 meters, covering districts every 2½ mos.	[G]Yes	Yes	18 months	Two three-month campaigns a year. Extensive newspaper adv., truck posters, home demonstrations	Co-operative adv. Company pays 50%. Co-operative campaigns
Q	Based on character of territory	Yes	Yes	18 months	No special campaigns	Co-operative adv.
R	Based on character of territory	Yes	Yes	24 months	Direct selling at a profit	None
S	Based on territory. Average 1,500 meters per man	Yes	Yes	18 months	Spring campaign four weeks, fall campaign six weeks, with stress on laundry machinery, but selling all appliances	Adv. features dealers. Furnish prospects and help close sales

[E]Sell cleaners on 15% com. and small appliances on 20% com.
[F]Small appliances only.
[G]Except ranges and refrigerators.
[H]Washers and ironers in combination 24 mos.

that this equipment has not been receiving much attention.

This has been true also with the dealers. In the tabulation of 100 utilities that reported dealer sales on this laundry equipment there was given a total for 1934 of 270,883 clothes washers and 26,822 ironing machines. Among the nineteen utilities we have been discussing here, those which represented dealer sales of both washers and ironers gave total dealer sales for the past 2½ years of 307,346 washers and 28,525 ironers. The dealers have sold the bulk of the ironers as well as the washers in these cities—as high as 88 per cent of the ironers and 92 per cent of the washers. But nobody is putting the power behind the ironer that it deserves, when its load value and service value are considered.

Sales methods among these nineteen utilities are pretty similar. All finance time sales—with eighteen months the standard term. Salesmen's compensation follows the infinite variety of prevailing local arrangements. With fourteen companies the laundry equipment salesmen sell other appliances also. Most of the ironer campaigns are supported by demonstrations and advertising. Many co-operate with local dealers to stimulate their interest and activity. But, strangely, seven say that they do not co-operate and three only co-operate through the local association, which, of course, may be liberal or not.

With equipment of this kind and the washer so well established, it is natural that the largest sales would be found where the largest number of domestic consumers is at hand. The largest city, despite a small sales staff, we find stands No. 2 in washer and No. 2 in ironer sales. The second city in size stands No. 1 in both washer and ironer sales. The third city in size stands No. 3 in washer sales and No. 7 in ironer sales. And this despite the fact that all have low saturations in both appliances. But there all regularity ends. The fourth city in size stands No. 10 in washer sales and way low in ironers. The fifth city stands No. 16 in washer sales. Company F, with the largest sales force, stands No. 9 in washer sales and low in ironers. Companies C and B come next in number of salesmen and stand high in sales. Company H, fourth in number of salesmen, stands No. 4 in washers and No. 6 in ironer sales.

In a word, no one utility in this group stands out as having done a spectacular job by the intensity of its selling. Neither clothes washers nor ironing machines have seemed important to load building. Therefore they have received relatively small consideration in the load-building program.

Two points stand out, however, that are worth attention in the plans of every utility sales department. First, ironers are worth ten times as much as clothes washers in increasing domestic consumption and, because of their low saturation and the high saturation of washers, they offer a vast number of prospects and should be pushed.

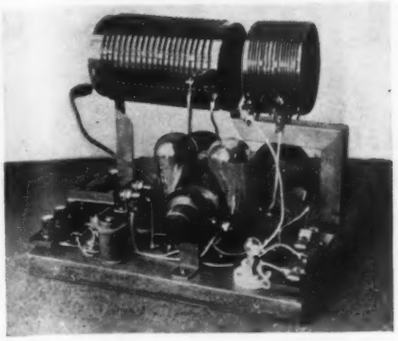
And, second, because this laundry equipment sells preponderantly through dealer outlets is no reason why it should be neglected in the power company's program. It provides so vital a service to the home that the full strength of the utilities' support should be behind it, not only in selling the idea but in demonstrating and active merchandising in full co-operation with the local trade.

It won't be long before experience in more active selling will be available. Several leading power companies have been campaigning on ironing machines this fall and will soon have some results to show. For the market here is too good to be neglected much longer.

Stream Gage Data by Automatic Radio

Twelve Daily Readings on California Rivers Sent In by Battery-Operated Sets to Central Hydrographic Office

By IRVIN M. INGERSON
Associate Hydraulic Engineer, Department of Public Works, State of California



Transmitter for automatic radio stream-gaging station has daytime distance of 330 miles

EXPERIMENTS carried on since 1931 by the State (California) Engineer's office have proved the adaptability of automatic radio transmitters to special uses in flood control and in irrigation or water distribution activities. Because critical stream-gaging stations on major streams are generally remotely located, wire facilities are uneconomic and are not particularly reliable without excessive maintenance. With the automatic radio stream-gaging stations which transmit readings at predetermined intervals, stream flow can be determined without a chance of error, without delay and regardless of weather, roads and other conditions. The use of these radio stream-gage transmitters has made possible not only more efficient water distribution, but also has averted local water shortages by timely advance information on stream conditions obtainable in no other way.

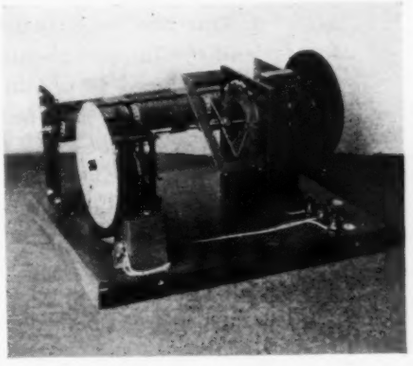
The apparatus by which the State Engineer's office keeps in nearly constant touch with the great central river system of California was designed to the end of maximum simplicity and reliability. Although the use of radio brings into use a highly technical specialty, the automatic transmitting equipment is neither complex nor bulky, the size of the component parts having been designed with the idea of having them placed inside the regulation gage houses, shown in the accompanying illustrations. Consisting of two major classifications of equipment, the transmitter and the keying device, the automatic radio stream gaging in California has been assigned four radio channels between 2,516 and 2,844 kc., corresponding to about 115 meters in the radio spectrum.

The transmitter was designed to have minimum power requirements. Having no source of electrical power near most stations, dry batteries must be relied upon entirely. Two-volt filament radio tubes with one tube or two tubes in parallel are used, the frequency of oscillation being controlled by a quartz crystal. The oscillating circuit is of a new design which materially increases the output to the antenna over the old conventional crystal oscillator circuit. The output from the transmitter is approximately one watt, giving daytime air line distance of transmission of 100 miles. The transmitter is powered by a set of six No. 6 dry cells connected in series parallel to furnish 4 volts across the series filaments of the two tubes and by a set of four heavy-duty radio "B" 45-volt batteries furnishing 180 volts as the plate supply.

Having developed a satisfactory transmitter, it was then necessary to design an automatic keying device which is the feature which makes the whole plan possible.* The entire

*Patents applied for by author.

Vacuum tubes are finding new uses daily in the power industry and in industrial operations. This article shows a new application and illustrates the equipment designed to give automatic records of stream flow on rivers. This is of the utmost importance in hydro power generation. All electrical engineers should be interested in this new development.



Ingerson automatic keying device which transforms fluctuating liquid levels into intelligent gage-reading signals

commutation motion of the device is derived from a falling weight geared through a time clock. The time clock has three functions, namely, that of keeping time, that of operating the time switches and that of operating a special commutator which keys the radio transmitter to give a series of short dashes indicating the gage height of the stream at the moment. The clock weight averages 17 lb. and drops approximately 1 ft. per day.

Electrically connected to the clock commutator is the selector or float commutator, the latter being actuated by means of the usual float and counterweight on a cable passing over a 1-ft. circumference pulley, the float changing positions in accordance with the rise and fall of the stream.

Circuits which convert the height of the stream into radio impulses are taken from the rotating selector drum equipped with three sets of ten segments and fingers, thus providing for three significant figures in the gage readings. Depending upon the connections, the height of the stream can be measured to one-tenth or one-hundredth of a foot. The range of gage height operation is unlimited in so far as the instru-

[*Continued on page 69*]

Resistance Furnace Capacitors Cut Costs

By W. H. AUSTRY
Engineer Stackpole Carbon Co., St. Marys, Pa.

W. H. CUTTINO
Engineer Westinghouse Electric & Mfg. Co., East Pittsburgh

Application of capacitors for the correction of power factor on induction motors, induction furnaces and under loaded transformers is well known; however, the use of capacitors for power-factor correction on resistance furnaces is unusual because pure resistance loads in themselves have unity power factor. But in the case of large resistance furnaces operated at low voltages and high currents the leads between the step-down furnace transformer and the furnace should be made as short as possible and carefully interlaced to obtain minimum inductance in the circuit. Although steps may have been taken to keep this inductance as low as possible, still the power factor may be low. This article deals with a condition where the power factor was found to be 70 per cent. Capacitors corrected it and paid for themselves in less than a year.

A CARBON company was purchasing power under a schedule which included a power-factor clause in the form of a kva. demand charge and it was decided to consider power-factor correction as a move to reduce operating costs. A study was made of the rate schedule, which showed that a substantial reduction in the power bill would be gained by improving the power factor of the four graphitizing resistance furnace loads especially and the plant generally to unity.

This plant has a connected load consisting of four graphitizing furnaces totaling about 500 kw., one 60-hp. synchronous motor and between 360 and 400 induction motors, totaling about 1,500 hp. The normal maximum demand of 900 kw. occurs between 7:30 and 11:30 in the morning and between 1 and 3 o'clock in the afternoon.

In checking the load power factor at several locations it was discovered that the power factor of the furnace units, consisting of furnace and furnace transformer, was approximately 70 per cent. This was quite surprising, as these are resistance furnaces and resistance furnace installations are usually considered as having good power factor.

These furnaces were designed by the carbon company and are used for graphitizing carbon material at very high temperatures. They are single phase, 60 cycle, and require about 125 kw. input at very low voltage, which means a very large amperage for the kva. involved. The high inductive drop and its accompanying large current results in an over-all power factor of approximately 70 per cent for the furnace units even with maximum interlacing and minimum distance from transformers to ovens.

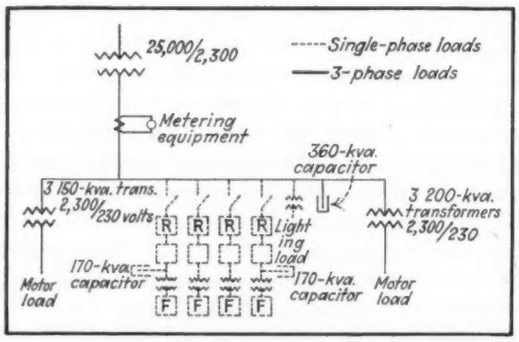
The kilowatt input to the ovens is controlled by varying the applied voltage on the furnace transformer by the use of induction regulators. In some cases the induction regulators were being worked up to their maximum rating, resulting in operating temperatures around the upper limit.

Capacitors lower bills 20 per cent

A survey showed that the expenditure required for equipment to correct the power factor from 70 per cent to unity would be a very profitable investment, since it would *reduce the power bills about 20 per cent per month, and, therefore, pay for itself after nine or ten months of operation.*

After considering the various ways of power-factor correction, it was decided to install 170-kva., single-phase, 60-cycle, 3,030-volt capacitors on the high-voltage side of two of the furnace transformers between the regulator and transformer and one 360-kva., three-phase, 60-cycle, 2,300-volt capacitor for connection directly to the 2,300-volt line. The capacitors were chosen for the following reasons:

1. Low losses (3½ watts per kva.).
2. No moving parts, which results in low depreciation and practically no maintenance.
3. The corrective kva. could be divided into several equipments at very little increase in cost.
4. Additional corrective kva. may be added as needed in the future by addition of individual capacitor units in the present rack.
5. Each individual capacitor unit is protected by a reliable indicating fuse which will remove it from service in case of an internal fault and allow the remainder of



Central-station power is furnished at 2,300 volts, three phase, 60 cycles, and is stepped down in the plant to 220 volts, three phase, for operating the induction motors, with two transformer banks. The furnace units are single phase and are connected to the 2,300-volt bus through transformers and regulators. Two capacitors on each of two resistance furnaces and one on the plant bus.

Fig. 1—Capacitors needed for "unity power factor" loads

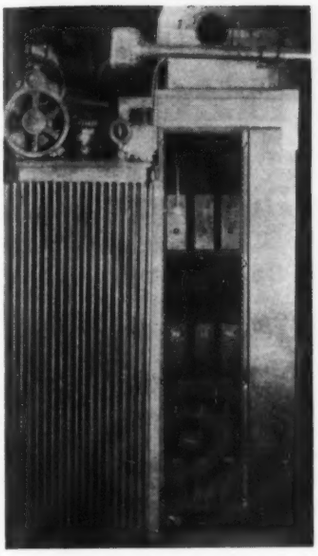


Fig. 2—Capacitors placed between regulators and furnace transformers

the equipment to stay in operation and continue to give power-factor correction.

Two 170-kva., single-phase, 3,030-volt indoor rack type capacitor equipments, each consisting of seventeen individually fused capacitor units, were installed at two of the furnace units (Fig. 1). They were connected between the regulators and furnace transformers (Fig. 2) and to the circuit breaker on the transformer side in order to correct the power factor of the furnace unit as a whole and eliminate the purchase of circuit breakers for the capacitors. This arrangement diminished the current through the regulators and resulted in the lowering of their operating temperatures and the elimination of the previous trouble with fuses blowing occasionally on the line side of the regulators. Since the kilowatt input to the ovens is controlled by varying the applied voltage with the regulator, this variation in voltage also automatically varies the kva. correction of the capacitor with the oven load.

One 360-kva., three-phase, 2,300-volt capacitor was installed on the 2,300-volt bus (Fig. 1) to correct the power factor of the plant load as a whole. This was an indoor rack type equipment consisting of 36 10-kva. individually fused capacitor units complete with discharge coils, circuit breaker, current transformers and trip coils inclosed in the capacitor housing, which has sufficient space so that as many as eighteen 10-kva. units, or a total of 180 kva., may be added in the future to take care of expansion in the plant load.

The three installations, totaling 700 kva. in capacitor correction, were installed at a cost less than the annual saving. This corrective kva., together with a few other minor changes, improved the power factor to about unity and resulted in a reduction in the power bills averaging 20 per cent a month, which represents a yearly saving of 30 per cent more than the investment.

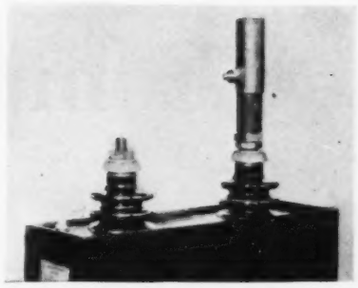


Fig. 3—Mounting fuses on capacitor terminals reduced installation and wiring costs

Deion fuses allow simple wiring connections and avoid the use of insulators, busbars and fuse clips, which are required with cartridge type fuses. These fuses have high interrupting capacity, will clear a circuit very quickly and are indicating. The blowing off of the black button at the top indicates that the fuse has operated. This means that the equipment can be checked for fuse operation by visual inspection. The metal chamber at the top of the fuse condenses the evolved gases, thus reducing the clearance required above the fuse.

Wyman on Social Insurance

UNEMPLOYMENT insurance is already a law, and whether we like it or not, it is going to be one that we will all have to operate under. It seems to me, however, that the most unfortunate consequence of this law is that under it the people of the United States will lose their right to struggle and work things out for themselves. We don't often think of suffering, even for food or shelter or clothing, as a right. We think of it as a penalty which is put upon us. But it seems to me that the right to struggle, to do it on our own, to win or lose on our own initiative is the biggest right that humanity has.

The more we take away that right to struggle, by this national law, or any other kind of national law, the more we undermine the morale that has made this country what it is. The problem of the unemployed, from the beginning of our country to the present, or nearly the present time, has been the problem first of the relatives and immediate families of the people who have been unemployed. Secondly, it has been the problem of the town or city in which the individual lived. And if that failed, in recent years it has been the problem of the state. It seems to me that this local responsibility is the real basis of our American civilization.

If we do not develop in every way the self-reliance, the independence, the freedom of our individuals, our country cannot go on. Our people will sink to the humdrum level of those who feel that they have a right to be supported by the federal government, who look to Washington to keep them going if they can't or don't want to do it themselves. Also, it seems to me, it is unfortunate to have money paid to the federal government to any greater extent than is absolutely necessary . . . the farther money goes from home, the less likely it is to return.

WALTER S. WYMAN,
President,
New England Public Service Company.

Company Personalized by

Customer Confidence in 141 All-Service District Representatives Promotes Better Relations as Well as an Enhanced Use of Appliances and Energy

In 1925 Owen D. Young said: "Only one danger confronts us. The danger is that growth of our industry will outrun public understanding . . . that people will see and fear our size without understanding our service." To slay the bogey-man of size and the other ogre of cold, routinized efficiency this Pennsylvania company is making the company a matter of one-man contact to its customers. Results are envied by those who learned them at a recent meeting of the Pennsylvania Electric Association. We are glad we could prevail on General Manager Reinicker to retell here what many companies could profitably emulate.

THE average electric customer sees too many faces—meter readers, salesmen, bill distributors, collectors, cashiers, servicemen. He cannot know all of these people—there are too many of them—and to make matters worse, they often are not "knowable" people. They haven't been picked for anything but their ability to do their job honestly and efficiently. They haven't been trained to see "load" as the objective of their labors and "public relations" as the path to "load," and generally have so much work to do in a day they can pay but scant attention to any one customer.

Our need today is for an ambassador extraordinary, minister plenipotentiary, to the Court of his Majesty, the Customer. We need even *more* than an ambassador, because we must dispense with form and formality. We need an employee who, in his own person, in his own words and through his own acts will present us to the customer in our true colors, unexaggerated and unadorned. Such an employee must be the company to the customer.

In addition to improved relations, there has been great need for some plan which would enable the utilities to dispense with the innumerable trips into the same territory by delivery trucks, service trucks, demonstration trucks, bill delivery cars and collectors' cars. Especially in the small towns, villages, settlements and surrounding rural and farm territory the cost of automobile transportation for employees carrying out the necessary service routine reaches large proportions, even though the time and attention given the customer are inadequate.

Plan started six years ago

Pennsylvania Power & Light Company is trying to meet this requirement through what is known as its District Representative Plan.

In 1929 we made an experimental installation of the district representative plan in one division. We have now 141 district representatives covering most of the thinly populated areas of the company's territory.

About 120,000, or 39 per cent, of our total residential and farm customers are now served under this plan. About 8,200 of this total are farm customers—75 per cent of all farm customers on our lines.

This plan is based on the fundamental fact that the way to increased residential load is through the customer's heart. The customer must first like the company and believe in it—the rest will follow.

Such a condition can only be created, as we see it, by frequent contacts by one individual, one familiar face. Because that face, as far as the customer is concerned, is the face of the company, we want it to be a fairly pleasant one.

Practically, this is accomplished by concentrating in one man, the district representative, all of the services rendered and contacts formerly made by many different employees.

Great care must be taken in the selection of this man. He must perform the duties of meter reader, service man, bill distributor, collector, appliance demonstrator and salesman. He must handle complaints and explain rates and be a general all-around utility man.

He should be a member of the community which he is to serve and a member of the most generally esteemed social organizations. Extensive personal acquaintance is highly desirable, and he should be able to speak the languages of his customers.

Previous employment with the company, selling experience, mechanical ability and knowledge are desirable, but not essential, providing he has a good personality, strong initiative and ability to contact people successfully. Tact is a primary requisite.

New appointees schooled in task

Salesmen, clerks, draftsmen and meter readers make the best D.R.'s, as they are generally called, although there is no fixed rule in this respect. Everything depends on the individual. We have had success with truck drivers, linemen, groundmen and servicemen. We have taken men fresh from college and had them turn out to be excellent D.R.'s, although these men required much more training than men with previous electric utility experience.

During his preliminary training, and while he is making his first contacts, the district representative attends late afternoon and evening classes for one month. At this school he is not only taught the fundamentals of his job but given, in addition, specialized

"D.R." Plan

By N. G. REINICKER
General Manager Pennsylvania Power & Light Company, Allentown

information in rates, ranges, meters, water heaters, billing, sales, etc.

Subsequently he attends regular weekly classes, at which he is brought up to date on recent developments in appliances, new sales materials, new service methods, changes in rates, and listens to, and gives, experiences in handling customers for the benefit of the other D.R.'s.

The responsibility of the continued training of the district representative is assumed, in the main, by the division and district managers.

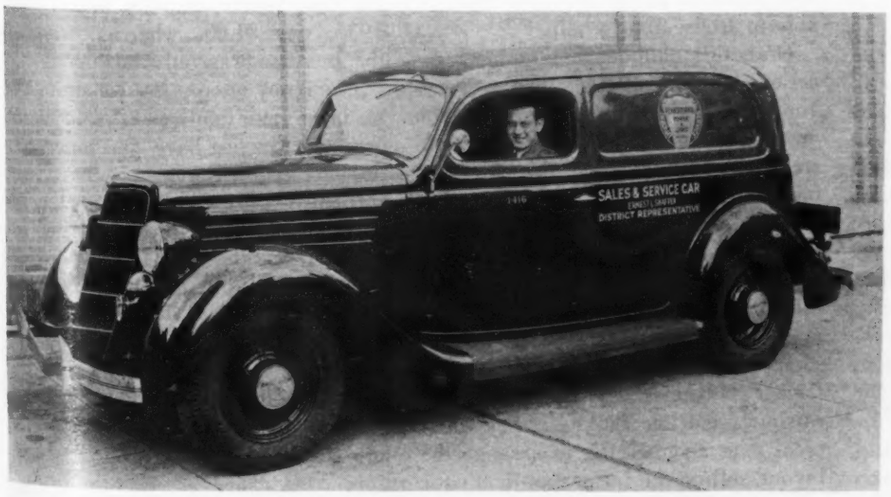
After training, the man is assigned a territory of from 700 to 900 customers, depending upon density of population, type of customer, geographical characteristics and sales potentiality. Experience has shown that it is undesirable to assign a larger number of customers to one representative, except in urban areas, because the time available for each customer is otherwise so limited that the representative reverts to the status of a meter reader, to the detriment of his other duties. He must not be so pressed for time that he is unable to repair the plug on the cord of Mrs. Brown's vacuum cleaner, call Mrs. Jones' attention to the desirability of a new type of toaster or explain to Mrs. Smith why her December bill was higher than her November bill.

The representative operating in scattered and rural areas is supplied with a panel body light truck for his sole use. This truck is of a standard design and is painted the usual red and black color of all such company equipment. Both sides of the truck bear the company symbol and name and also the employee's name as representative of the company.

The district representative operating *entirely* in the confines of small towns is not assigned a truck. The use of a truck in the 32 more thickly populated areas where the plan is now in operation is not only a hindrance to the D.R. in his door-to-door calls, but is uneconomical because customers in such areas are located within very short distances of a company office and are accustomed to using it. They go to the showroom to see appliances on display and seem to prefer to pay their bills at the cashier's window in preference to any other method. As a consequence, general service trucks and delivery trucks are necessary and assignment of a truck to the D.R. cannot be justified, principally because it does not replace any existing equipment. In such territories as many as 1,200 customers may be taken care of by one man.

When the district representative is assigned to a territory a letter of introduction bearing his photograph and telephone number is sent to each customer in that territory, and if he is to be furnished with the standard panel body truck his photograph shows him with the truck in the background. This introduction paves the way for the better service and additional attention the customer receives.

He calls regularly upon each customer in his territory and is responsible for keeping the customer's appliances in good operating condition and *in use*. He makes small repairs and adjustments, investigates radio interference and other complaints and reports those he is not able to settle. Service difficulties are investigated, wiring and fixtures are inspected, improvements are suggested and simple meter accuracy tests are made whenever necessary.



Truck carries stock of appliances

This truck is equipped with a compartment to carry small appliances, such as irons, percolators, waffle irons, heating pads and refrigerator for display purposes, and one or the other of the latest model is carried most of the time.

The plan is particularly adaptable to sparsely settled and rural areas. The D.R. not only explains the necessity for the minimum guarantee on rural extensions and the way it is calculated, but he is able to improve the situation materially in two ways: First, by securing new customers and thus reducing the amount of guarantee required per customer, and, secondly, by introducing new appliances and uses he shows each customer how to get the benefit of all of the kilowatt-hours included in the minimum guarantee. In addition, his familiarity with the territory enables him to develop prospects for new extensions. In doing all this he not only serves the company, but himself, for each new customer represents additional opportunities for the sale of electrical equipment.

A regular monthly call is made on each customer for the purpose of reading the meter and a subsequent call is made for the purpose of delivering the bill and collecting the amount due. The collection service is solely for the convenience of the customer, and although this form of payment is optional, we are collecting on an average 20 per cent of the revenue of these areas in this manner, and in some territories as much as 57 per cent. In all territories the amount being collected by the D.R. is gradually increasing.

He not only collects current accounts, but is responsible for those less than one month overdue. In the case of accounts one month or more overdue he tries to find the reason for the delay in payment, but has no authority to effect a compromise. He then may be relieved of the responsibility of collection, but if disconnection becomes necessary he is notified in advance.

Load-building bonuses augment salary

The salary of the D.R. is fixed at a base of $90 to $100 per month. In addition, load-building compensation is paid on all sales of appliances, varying with the type of appliance sold, and is automatically increased upon attainment of set quotas. The average earnings for the past twelve months of those who have been established for one year is $140 per month, and have averaged $260 per month for some men.

A monthly earning of $260 should by no means be considered a maximum. The D.R. who has the confidence of his customers, who is a good salesman and who has a thorough grasp of the situation is, in effect, operating his own business—he can take compensation out of his territory each year in proportion to his selling ability and the purchasing power of his customers.

The success of the plan depends upon the ability of the D.R. to secure the confidence of the customer. He must not only secure the customer's confidence, but he must be the customer's friend. He must familiarize himself with the customer's domestic and business problems. He must be able to advise and to help.

Once this confidence is gained, excellent public relations are assured, and load building becomes largely a matter of improving the customer's standard of living—or his business methods. One D.R. said to me recently: "I know right now the people I am going to sell ranges to next year." It is interesting to note that this man had previously been a lineman for more than ten years.

A certain D.R. interested one of his farmer customer friends in poultry raising, securing the necessary technical data and helping to arrange the layout, selling the farmer an incubator and brooder and showing him how to arrange for marketing the chickens. This venture has been such a success that poultry is now the farmer's second largest source of revenue. He credits the company for showing him how to do it.

Again, there is a road stand in the Pocono Mountains whose proprietor never loses an opportunity to praise the company's service. He says the D.R. taught him how to attract trade and has helped him make a lot of money. He is properly grateful and his place is completely electrified.

What D.R. Plan Does

Promotes mutual understanding.
Replaces multiple contacts by one familiar, respected personality.
Gives the customer local, continuous, immediate, sympathetic service.
Keeps the appliances in working order and working.
Substantially reduces complaints and cause for complaint.
Gives employee direct incentive to local load building.
Eliminates duplicating mileage of men and vehicles.
Promotes increased placing of appliances.
Promotes increased usage of energy.
Above all, makes district representative "the company" to the customer.

Public contentment gained

By far the greater part of our return from the plan is in the form of vastly improved public relations, which cannot be directly evaluated. Minor complaints invariably show a sharp decrease immediately after installation of the plan.

There is one return from the plan, however, that can be evaluated, and that is the increase in kilowatt-hour consumption per customer which comes with sales of additional appliances and through the increased use of appliances already sold.

Taking the installation as a whole, we find that the plan accelerates the increase in kilowatt-hour sales per customer—that the average rate of increase in D.R. territories last year was approximately 36 kw.-hr. per customer per year, whereas in unconverted areas it was only approximately 26 kw.-hr., a difference of 38 per cent.

Company sales of appliances averaged $6.20 per customer last year in D.R. territories, as compared with sales of $4.70 per customer for the same period elsewhere. The increase in appliance sales in D.R. territories for the twelve months ended July, 1935, was $1.03, whereas elsewhere the increase was only $0.70.

I am not attempting to claim that we have made any remarkable discoveries or that we have developed anything essentially new. Some will recognize a resemblance to the old Stone & Webster set-up—enlarged and adapted to the P.P.& L.Co. system, with the addition of the individually assigned trucks.

Some might say that the plan requires supermen to fill the jobs. Our experience has been that there is no particular difficulty in selecting suitable men for this quite popular position.

Self and Mutual Induction Chart

By A. F. ANDERSON . . . L. R. VIANEY*

Electrical Engineering Department, Boston Edison Company

IN MANY distribution system calculations the voltage drop induced in particular circuits is often required. This can readily be obtained from the accompanying chart, Fig. 1, which, if used with reasonable care, will give readings equivalent to 10-in. slide-rule accuracy on a chart about 15x20-in. over all, excluding titles. The chart was determined from the following equation for self and mutual induction voltages given in Woodruff's "Electric Power Transmission and Distribution":

Volts drop in phase with current per thousand feet of wire =

$$[I_a\ (.08047\mu + .7411 \log \frac{1}{r_a}) + (.7411 I_b \log \frac{1}{D_{ab}}) + (.7411 I_c \log \frac{1}{D_{ac}}) + (.7411 I_d \log \frac{1}{D_{ad}})] \frac{0.377}{5.28}$$

I_a = Current in phase A under consideration.

I_b, etc. = Current in phase B, etc.

μ = Permeability of surrounding material (air = 1).

r = Radius of the copper wire in inches.

D_{ab} = Distance between phases A and B in inches.

D_{ac}, etc. = Distance between phases A and C in inches, etc.

The chart is easy to use, as the following example shows:

Assuming that it is required to find the self-induced drop in a three-phase, 60-cycle, 1,000-ft. section of No. 1/0 stranded wire carrying 100 amp. at a power-factor angle of 70 deg. lag, the procedure is as follows:

From the 100-amp. point on the scale marked "Line Current" lay a straight edge (1) to the point indicating No. 1/0 stranded wire on the extreme left-hand scale. This

[*Continued on page 90*]

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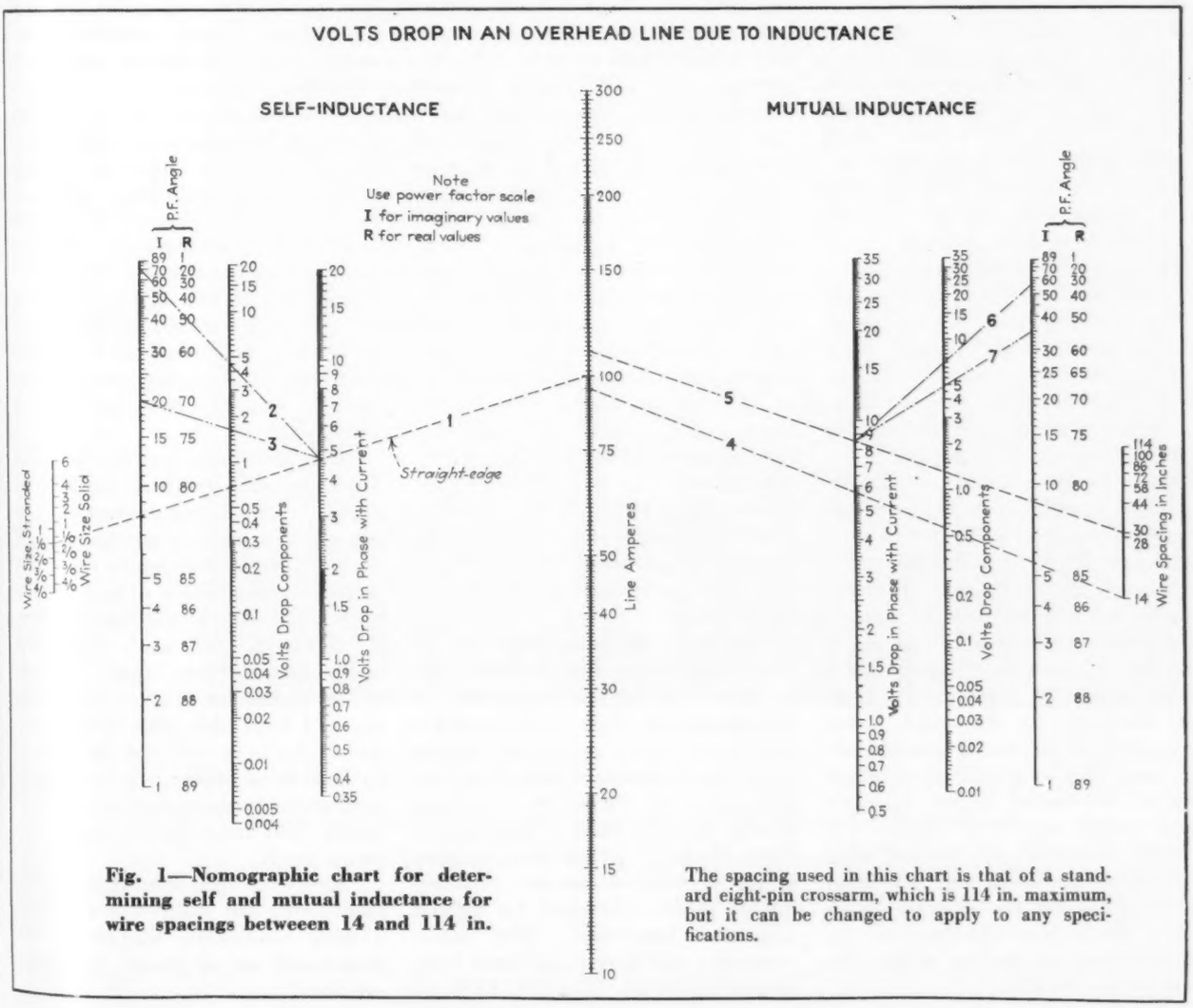


Fig. 1—Nomographic chart for determining self and mutual inductance for wire spacings betweeen 14 and 114 in.

The spacing used in this chart is that of a standard eight-pin crossarm, which is 114 in. maximum, but it can be changed to apply to any specifications.

Nelson Sees New Power Plant Trends

NOWHERE in the field of engineering are more significant ideas churning today than in electric generating plant development. Advances in prime mover and boiler design are challenging power producers and vendors to face a new situation in which a closer entente between industry and utilities is indicated. Because Arthur L. Nelson is intimately identified with this trend as a consultant of bold achievement in this branch of professional activity I asked him to outline the problem of economic power production for the benefit of ELECTRICAL WORLD readers.

"Mr. Nelson," I asked, "how much truth is there in the thought that very large power plants for industry and for utilities are 'on the carpet' of economic examination in view of the competitive possibilities of smaller stations?" "I see a definite trend toward smaller plants for industrials," was the reply. "The trend is less marked with utilities, but should be given more thought in looking forward."

"What is the reason?" was asked.

"Better engineering in both design and construction of industrial plants is one factor," said Mr. Nelson. "More study is being given to local manufacturing conditions, to the combined production of steam and electricity in a single station, the use of waste products as fuel, utilization of waste heat and applications of Diesel and gas-driven generators. Important economies can also be accomplished under the proper conditions by the development of a joint plant to serve a group of industrials, say from two to fifteen factories. Such a plant may produce steam for factory processes and heating, electricity for industrial power drives and hot water for manufacturing uses. This smaller scale application of the central station principle often works out very nicely and achieves economies far beyond what could be accomplished with individual power plants for the separate industries. Equipment development by manufacturers is another major element in the situation."

An Interview by
H. S. KNOWLTON

"This is a real challenge to power utilities," said the ELECTRICAL WORLD man, "and would you be specific?"

"Surely," replied Mr. Nelson. "Steam turbine generators are now being developed with capacities as low as 200 to 300 kw. with high efficiency, provision for steam extraction and high-pressure operation if desirable. The same thing with boilers—100 to 300-hp., high-pressure designs and high-efficiency service are available. Industrial power production costs in even small stations are down. We can get steam at 15 to 25 cents a thousand pounds and electricity at less than 5 mills per kilowatt-hour, and with moderate investment, indeed much below utility capital costs per kilowatt. There is a distinct trend toward limiting the size of manufacturing establishments for economic reasons, notably to cut distribution costs and locate at strategic points. A modern small generating plant serving a concentrated distribution system can often be built for less than $100 and sometimes as low as $50 per kilowatt; it can run under conditions favorable to the sale of heat at 5,000 B.t.u. per kilowatt-hour, making it three times as efficient as the big station which ordinarily runs on a condensing cycle and does well to achieve an economy of 14,000 B.t.u.

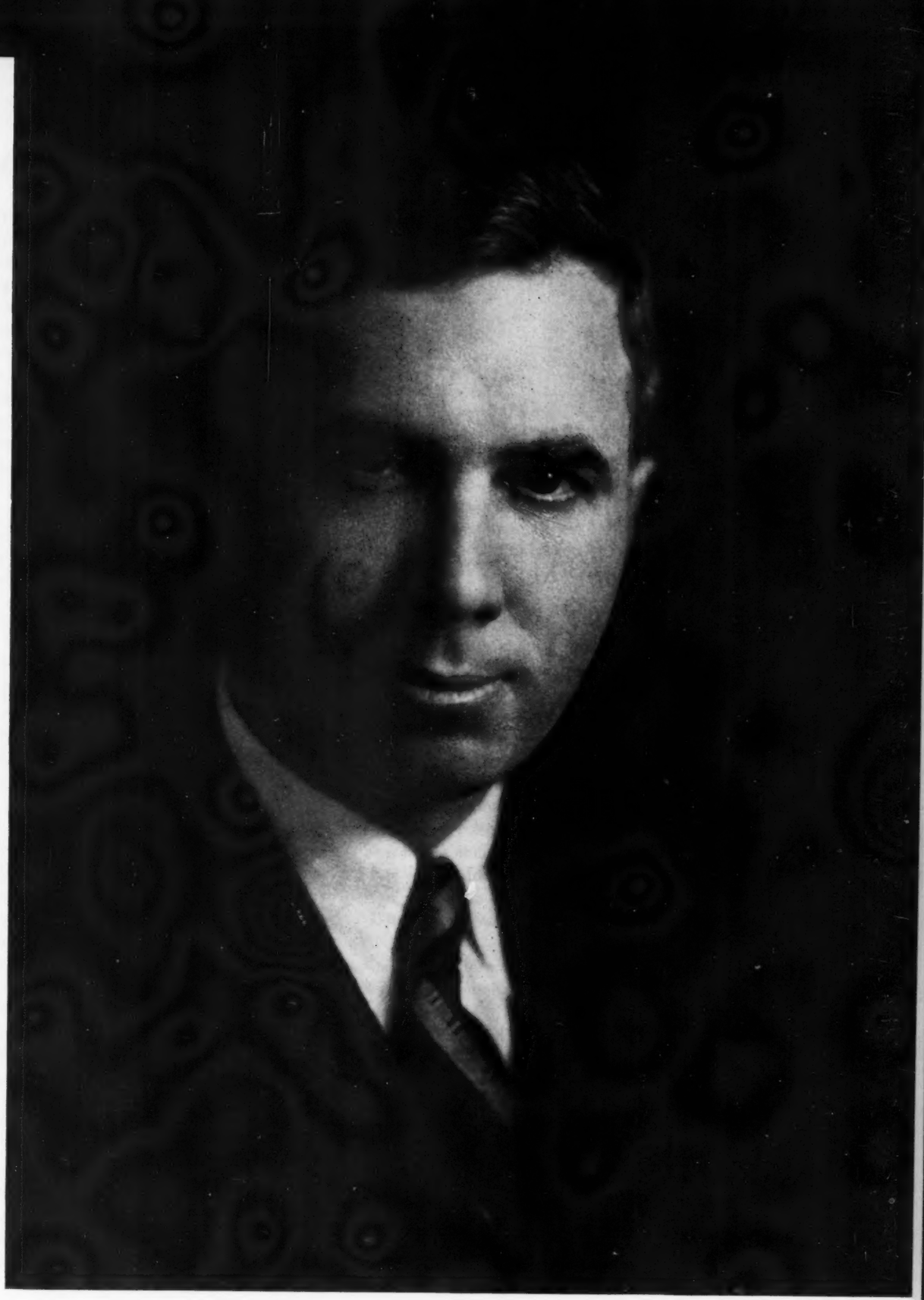
"This is the direction in which I believe utilities must move in many cases in order to meet the competition of new equipment. Such developments—that is, in plants measuring outputs more in thousands rather than ten thousands of kilowatts, perhaps smaller in some cases, would remove large blocks of power from existing utility distribution systems, enabling further loads to be cared for without additional investment. The power companies will have to get away from generating plant costs of $150 to $200 per kilowatt, with heavy investment in spare capacity and distribution facilities often bringing the total cost of the system to $600 or more.

"Utility managements would do well to consider, in place of enlarging existing big stations, the building of moderate-sized plants in the middle of or close by industrial groups. Such plants should be designed after most careful study of conditions in the industries at hand, with full analysis of possible advantages in the use of turbine generators with non-condensing, extraction or mixed pressure units, and the possible production and sale of electricity, steam and hot water. The possibilities of using internal combustion driven prime movers should also be evaluated, along with utilization of waste.

"We have an example in a utility station in Massachusetts, with a main turbine generator operated largely non-condensing, exhausting steam to fourteen near-by industrials in addition to its electric power service. Another plant in an Ohio industry runs at 450 lb. and 750 deg. F. total temperature, has units with a maximum efficiency of 86 per cent, sells steam and produces electricity in non-condensing turbine sets at a 'manufacturing cost of 3 to 4 mills.'

"The limitations in the so-called 'super-stations' are those imposed by excessive capital and production costs per unit of capacity and output. Were the utilities to operate under the highly competitive conditions of many industrials, such costs would throttle them. I feel that we will see a closer rapprochement between industrial and utility plants for the foregoing reasons. I hope that such co-operative use of facilities will not be delayed so long as to bring about a situation comparable to that which arose in the transit field from the coming of the motor coach.

"Surely the open-minded generating plant owner and utility man will adopt a more constructive attitude in this transitional era in power plant engineering."



ARTHUR L. NELSON, distinguished among Boston's younger consulting engineers for his economical solution of power plant problems, indicates a promising approach to the treatment of an increasingly competitive situation.

ELECTRICAL WORLD

L. W. MORROW • EDITOR

PUBLISHED EVERY OTHER SATURDAY BY McGRAW-HILL PUBLISHING COMPANY, INC.

VOLUME 105 ESTABLISHED 1874 NUMBER 23

NOVEMBER 9, 1935

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State Regulation Has a Future

NOT so long ago the fear was that court decisions would whittle away whatever chance the state public service commissions have to do an effective job in regulating utilities in the interest of both the public and the investors. This year the fear is that new federal legislation and new federal bureaus will be the death of local regulation. Most remarkable is the fact that all these new nationalizing moves were besought by the state commissioners themselves to clinch, as they thought, their authority over motor trucks, communication companies, utility holding companies and security issues. Having got what they resolutioned and testified for, now they wonder whether they have not signed an undated death warrant for themselves as well as for holding companies.

At the recent convention of the National Association of Railroad and Utilities Commissioners members of all four of the federal boards—I.C.C., F.P.C., F.C.C. and S.E.C.—gave assurance that they had no intention or desire to encroach upon the prerogatives of the state boards, and there was a wholesome and sincere tender of mutual and co-operative functioning on both sides. Nevertheless, the state commissioners know in their hearts that all roads lead to and from Washington, and that it is inevitable that the swarm of new agents will step by step steal the province of the state's policing power unless they can justify their perpetuation by accomplishment for the benefit of their home communities. And that is where the weakness in state regulation today lies and where the change must come if the institution is to survive in the face of the centralizing tendencies of the era.

To pin their accomplishment almost entirely on rate reductions in seven figures is a hazardous commitment. Electric rates have been reduced by commissions and by companies to a very creditable degree. But they have gotten fast to the levels where further reductions must await response of the public expressed in more intensive use of the kilowatt-hours. If next year the commissions can claim to their credit only a third as much reduction, will they not be viewed by the public as having sunk to one-third their previous efficiency? That looks like a generous certainty, and the commissions will do well (and the utilities will do well to show them how) to bring before the citizens other things that they are promoting in the way of safety of people, safety of investment, standardization of practices, long-range economic planning, conservation of local industries and resources, etc.

The American public will blame the utilities and today's commissions if, some day, they find themselves at the mercy of Washington staffs that play hob with local good while toying with an obsession to level off everything, coast to coast, regardless.

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Social Insurance Starts Out

ONE of the New Deal ideas incorporated in a federal law is unemployment and old age insurance. On January 1 the unemployment insurance of 1 per cent of the payroll will be applied, although payable in 1937. A year later old age insurance goes into effect. That is, if this federal law is held to be constitutional. These insurance laws, if properly supported by state acts, will add a tax of from 10 to 20 per cent to all industrial payrolls.

Aside from constitutional arguments, this social insurance needs to be considered carefully. All are sympathetic to the idea, but there are grave social and economic questions involved in any practical application of this type of wholesale social insurance. This law is discriminatory, the insurance is admittedly only a palliative, there is a question as to whether the reserves can be used when needed and the foundation for the legislation is governmental paternalism. But beyond this lies a fundamental thought.

It has long been the American idea that people should struggle and work for themselves. Privation, unemployment and old age have been thought of as penalties and not rights. This thought has built the morale and citizenship that made this country great. Old age and unemployment have been problems, first for the individuals, then for their families and relatives, and last for the county and state. Any one "going to the poorhouse" has heretofore admitted complete defeat in life and accepts the act as a social stigma. There is no pride left.

Our country must rest upon the self-reliance, the independence and the freedom of its individual citizens, and any move to undermine this concept is fraught with the greatest possible danger. This New Deal social insurance strikes at our social foundations and beckons us on to a humdrum safety that rests upon a benevolent government. Social insurance of this kind is an imported idea. It does not measure up to the social standards of this country.

Plans in Budgeting

ANY study of load trends indicates that utility budgets will be increased considerably for 1936. But whether these budgets are prepared upon a dire necessity basis or on a planned basis offers the true test of their economy in developing system facilities. The economic approach is to make a study of loads and load expectations and then develop the system as a result of an engineering analysis.

Some typical points to consider are the best ways and the best places to add generating and transmission capacity; the extensive use of faster breakers and those with higher rupturing capacity, as well as the adoption of the reclosing principle; the best way to reduce outages and improve voltage regulation on the distribution system by use of newly developed transformers, regulators and protective devices; the full use of metering and wiring devices of the several new types to afford better and less expensive service; a better and more complete relaying and metering system to check operations. In other words, increment or piecemeal construction should fit into an intelligently devised system plan for expansion and remodeling.

There is money to be saved as well as spent in making a study of a system in the light of load expectations over the coming year or two to arrive at general conclusions that embody the latest devices to improve service and reduce costs. Replacement today does not mean duplication of existing equipment. Expansion today does not mean an extension of facilities based upon installed equipments and old designs. There are new things to be had that are better and that fit the coming system operating conditions to better advantage. Budgets should be supported by economic and engineering facts based upon a system-wide and a long-term outlook.

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Strokes Follow Ionization by Collision

BOYS' moving camera permits separations of the successive stages of the lightning stroke, and so affords a knowledge not only of their sequence but also the time intervals between them. Using this method Schonland and Collens showed that the first and necessary stage is a "leader" stroke beginning somewhere between the cloud and the earth, shooting downward as a dart or projectile of moving electrons, and leaving behind it a conducting path over which the main discharge takes place after the "leader" reaches the earth. A velocity of 3×10^{10} cm. per second for the tip of the "leader" was indicated and it was suggested that this tip was made up of electrons moving with increasing speed under the steep potential gradient as the tip with its conducting tail approached the earth.

This conclusion has now been questioned by Cravath and Loeb (*Physics*, April, 1935), who conclude that the high velocity (about 1/10 that of light), mentioned for the electrons could only be attained in a potential gradient of 4×10^6 volts per centimeter, which is far beyond the real values. Consequently from studies of the probable diameter of the tip and conducting tail they conclude that the field just ahead of the tip is sufficient to cause ionization by collision in the air, and this progressive state of ionization not only supplies the ions of the conducting tail but constitutes the motion forward of the leader tip itself. The difficulty of the impossibly high speed for the electrons is thus removed, and the speed as observed is that of an advancing state of ionization which conceivably might approach the velocity of light as in a conductor, but which is slower in the lightning stroke owing to the element of time in the process of ionization of the air.

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Home Laundry Load Eventually —Why Not Now?

IF WE could look ahead, well, say ten years, it would make some interesting changes in the present attitude of power companies toward domestic load and service to the home. At the moment, we see the market as pretty much restricted to light and refrigeration, with cooking and water heating looming large. Men who look ahead more than the average are really interested in selling the broader idea of the electric kitchen. But too many are so intent upon building up domestic consumption quickly that the rest of the opportunity and much of the obligation are being ignored and neglected.

As a matter of fact, there is another room that also presents a vital problem in the home, where electricity is destined to do one of its best jobs for the modern household. It is the laundry. And one of these days this business of washing, drying and ironing the family clothes is going to bulk big as a source of revenue from residence consumers for every progressive utility. For the ironer uses a fair amount of energy and so will the drier.

Most of the appliances which the electrical industry has presented offer advantages of convenience, comfort and luxury. Few approach the customer from the angle of saving money in the ordinary business of housekeeping. But laundry equipment does. For here we have a regular item of weekly household expense, plus a problem in management; a comparison between the outside laundry bill, with heavy wear and tear on clothes, and the cost of doing the job at home. Ten million washers and 200,000 ironers offer testimony that it can be done electrically to advantage. And eventually the industry will awaken to a realization of

what complete home laundry service can mean as a market and go after the revenue.

The study of the methods used by nineteen companies which have been pushing clothes washers and ironers appears on page 28. It is interesting evidence that some companies now recognize the vital service that this laundry equipment renders to the household and consider it worth working on. They have been wise enough to see that it is not necessary to neglect the laundry in order to give attention to the kitchen. For both are important to the customer. And studying these figures, one cannot help wondering why the industry waits. This laundry load eventually will be paying dividends for every company. All it needs is intensive selling.

· TRENDS ·

THE EDITORS USE A SPOTLIGHT ON CURRENT HAPPENINGS

Weak-Kneed Rate Reductions

WE BELIEVE in low rates, but would rather stress form of rate than magnitude. But we also believe in reasonable rates. The service, the industry and the public will be benefited by having prosperous utilities. Rate reductions should be warranted. That is why we shudder at some of the rate reductions put into effect this year. They were not all warranted. Some were granted because of lack of courage to fight. These were political rate reductions and if one is grantel others are immediately in the offing. This industry will not get anywhere by granting unjust demands. Executives should fight this type of rate reduction. This is their duty to their stockholders and to their customers. Courage in a just cause always brings public favor.

Two Elements that Beat as One

FOR years it was assumed that a network or polyphase meter just had to have at least two distinct elements and two disks. That obsession passes now to the fallacy category. The first of the four meter manufacturers is out with the announcement of a multi-element meter with no larger space requirements than a single-phase meter, and undoubtedly the others are ready to do likewise. The power industry is now to be afforded the advantages of space, size and weight economies that can narrow the spread in cost between single-phase and polyphase metering.

When I Was a Boy

WE HAVE all met the old gentleman whose tales show how much better things were "when he was a boy." They usually bore you, or at least you don't believe them. We feel the same way today when we meet some engineers and executives who see no future ahead. They keep looking backward. And we don't believe them either. The electrical industry has just started to grow. It and its facilities will change. We venture to predict that ten or fifteen years from now no one would recognize the power station, the underground system or the industrial plant layout that affords electric service. There are more new things on the horizon than ever before and more opportunity for growth and for engineering advances. It is high time we got over the "when I was a boy" alibi as a philosophy of business.

Interstate Comics

IF ELECTRICITY is converted into bright lights that may be seen by an observer in an adjoining state, does that constitute interstate commerce with vision? An exercised utility official asked us that poser while relating that he had been instructed by one of his government-bureau customers that he must henceforth buy only Guffey act coal. It just happens that he has no steam plants. He now wonders how long it will be before his hydro-kilowatt-hours will be declared tainted because the stream is found to flow polluted water.

Less Colds with Air Conditioning

"TIME out for colds" is becoming a rising factor influencing business houses to look critically and favorably upon air conditioning. In rounding up some data W. R. Lockhart of the York Ice Machinery Corporation finds several confirmatory bits of data. Philadelphia Electric experienced a one-third reduction in days lost because of respiratory disorders. American Tobacco had a decrease to one-fifteenth the unconditioned figure. International Business Machines and Humble Oil are increasing their installations, and this health factor enters as a production-increase influence even though specific data are not available, as in the Philadelphia case.

Worth Quoting on "Quoddy"

GEORGE W. STETSON of the Stets Company of Boston refuses to bid on equipment for the Passamaquoddy project. He wrote: "We do not care to bid on equipment for this or any other government project which is unsound. Such projects waste the taxpayers' money and the nation's credit—within ten days Col. G. R. Lukesh of United States Engineers stated publicly that this project will cost $50,000,000 to build . . . $1,250 a kilowatt, or ten times the cost of an economically sound hydro plant that could compete with steam power. If the charges for the power are based on its costs no one could use it, and if not charged on a cost basis you will be soaking the taxpayers in all parts of the country. These federal projects which compete with private industry for 'bulldozing' or 'vote-getting' purposes destroy the confidence of investors and business men and thereby retard normal business expansion. Taxes come from profits. Profits come from business. Under your system the end is bankruptcy." We say hurrah for a manufacturer who has the courage of his convictions.

Superficial Analysis

EVERY ONE seems to use the word research. This is belittling the subject. Here is a case in point: "Much of what is frequently called research is a travesty on the scientific method. This is particularly true in matters of government. It is amazing to observe problems being 'solved' when they contain a group of unknowns, any one of which may be more potent in affecting the solution than the factors studied."—*Frank B. Jewett, president, Bell Telephone Laboratories.*

NEWS OF THE INDUSTRY

Utility Act Flayed at I.B.A. Meeting

Eustace Seligman denounces law as a menace to all business — Securities committee lists T.V.A. as more important problem — Optimistic on outlook for utility industry

Assailing the Public Utilities Act of 1935 as uneconomic, unsound, unfair and unconstitutional, Eustace Seligman of the law firm of Sullivan & Cromwell of New York told members of the Investment Bankers Association of America, meeting at White Sulphur Springs, W. Va., last week, that unless the United States Supreme Court declared the act unconstitutional it would mean, in his opinion, the extension of federal control to such an extent as to jeopardize every business in the country.

The Utilities Act is uneconomic, according to Mr. Seligman, because it "burns down the house in order to kill the vermin; it is unsound in giving such unlimited power to agencies of the federal government."

Committee takes compromising view

The view of the committee on public service securities was that regulation will presumably be acceptable to the industry, notwithstanding the long-continued protest against it, in which the Investment Bankers Association joined. It added that it may well be to the advantage of the industry if in the ultimate outcome regulation is placed within the province and under the auspices of the Securities and Exchange Commission. "Whatever the final decision may be," the report said, "the Public Utility Act marks not an end but a beginning; it may be hoped that as a result of court decisions, or otherwise, it may be so modified as to become the beginning of federal regulation within proper legal limits."

It was the opinion of this committee that because the turmoil of the recent past may have disturbed a proper sense of proportion, it may be said that of the various matters affecting the industry their order of importance is, first, rate determination by state commissions and the courts; second, T.V.A. and governmental competition which bears on rate determination, and, third, the Public Utility Act.

The report touched an optimistic note in discussing the outlook for the utility industry. "Despite harassments of the year," it stated, "the electric power business has prospered, although the uncertainty resulting from the government program continues to block new construction. Electric power production in the third quarter exceeded all previous records, indicating a recovery of all ground lost during the depression, and the outlook is for continued expansion. Domestic consumption has shown steady gains and the recovery in industrial demand has been significant. Market prices of utility stocks generally have registered a substantial advance, which of course is shared by the general list. Improvement in the bond market has permitted refunding operations on a large scale, and the consequent reduction of fixed charges will at least help to balance the constantly increasing tax burden. There is merit in the contention that in the final analysis future values will be determined not so much by the Public Utility Act as by the state of the industry."

R.E.A. Grants Loans Totaling $1,274,084

4,247 farm customers to be served — Six public concerns and one private to receive funds

Loan contracts involving $1,274,084 to finance the construction of 1,122 miles of electric lines serving 4,247 rural customers were signed November 4 by Morris L. Cooke, head of the Rural Electrification Administration. Of the seven projects involved only one, covering 3 miles of line at a cost of $6,100, is sponsored by a privately owned utility. This is explained by the fact that most such applications are for large projects involving $500,000 or more, according to Mr. Cooke, and therefore require more time for investigation and study. Two days later four additional grants totaling $1,065,528 were made for 800 miles of line to serve 4,000 homes.

The largest project to be approved so

BIG TALK ON LITTLE HOUSES

Harris & Ewing

High officials of the New Deal's housing family photographed as they concluded a conference with President Roosevelt. Left to right: Peter Grimm, housing expert working in the Treasury Department; Morris L. Cooke, head of the Rural Electrification Administration; Henry Morgenthau, Secretary of the Treasury, and Stewart McDonald, head of the Federal Housing Administration. Mr. Grimm and his associates in New York are completing a report on housing conditions east of the Mississippi River which is expected to have a bearing on the future policy of federal housing, Works Progress Administration, Rural Electrification program and Rural Resettlement.

far is located in Boone County, Indiana, and is sponsored by the Indiana State-Wide Rural Electric Membership Corporation, developed under a new statute by the state Farm Bureau. This body is a new form of farmers' co-operative adapted to the business of distributing electricity. Although construction will be carried on by a subsidiary organization known as the Boone County Rural Electric Membership Corporation, the statewide body will provide maintenance, insurance and other services to this and other county co-operatives within the state. The Boone County project embraces 587 miles of line to reach 2,200 new rural customers. The entire cost, up to $567,926, will be loaned by R.E.A. Proposed rates, subject to the approval of the State Utility Commission, will provide 100 kw.-hr. per month for $4.95, and additional kilowatt-hours for 3 cents and 2½ cents.

A second county-wide project will be undertaken by the city of Dayton, Tenn., which now has a municipal power plant and is also purchasing from T.V.A. It plans to extend service throughout Rhea County by building 38.9 miles of line to serve 215 farms. The first 100 kw.-hr. will cost $3.50, covering the standard T.V.A. resale rate plus a surcharge of 1 cent per kilowatt-hour to amortize the R.E.A. loan of $38,058.

Two lines in Nebraska

Scotts Bluff and Sioux Counties, Nebraska, will be served by the Roosevelt Rural Public Power District, which will build 226½ miles of line connecting 839 new customers at a cost of $310,000. Power will be purchased from four municipalities which secure it from hydro-electric plants of the U. S. Reclamation Service at Lingle and Guernsey, Wyo. In another section of Scotts Bluff County the Gering Valley Rural Public Power District will erect 47 miles of line to serve 143 customers at a cost of $65,000. In Miami County, Ohio, the Miami Rural Electric Co-operative, Inc., is borrowing $254,000 to build 193 miles of rural line to serve 690 farms. The Bartlett Community Light & Power Company, a corporation buying power from the municipal plant in Bartlett, Tex., will use $33,000 to construct 30 miles of rural extensions serving 110 miles in Bell and Williamson counties. The only private utility loan is $6,100 to the Central Iowa Power Company for 3 miles of new line in Dallas County, Iowa.

In all cases the R.E.A. loans cover the full cost of the projects at 3 per cent, to be liquidated in twenty years. Equipment loans through E.H.F.A. are promised to help build up an immediate load. The Central Iowa Power Company pledged its general credit as security.

More project announcements are expected very soon.

Power Commission Defers Action on Mergers of Utilities

Seeks co-operative plan with S.E.C. — Many utility directors fail to comply with provisions of new law — Utility act valid, government holds in Baltimore suit

Action has been suspended by the Federal Power Commission on all pending applications for the approval of mergers, sales and acquisitions of public utility facilities. This action was taken to permit the commission and the Securities and Exchange Commission to determine procedure for co-operative administration of the 1935 Utility Holding Company Act and to avoid any duplication in the activities of the two commissions.

Pending applications that will be temporarily delayed are: Northern Pennsylvania Power Company and Metropolitan Edison Company, Empire Gas & Electric Company and New York State Electric & Gas Corporation, Empire Light, Heat & Power Corporation and New York State Electric & Gas Corporation, New York Central Electric Corporation and New York State Electric & Gas Corporation, West Florida Power Company, Ocklawaha Power Company and Florida Power Corporation, and Toccoa Electric Power Company and Tennessee Electric Power Company.

Reports that at least one, probably more, of the leading public utility holding companies would precipitate a test of the act by refusing to register with the S.E.C. by December 1 gained weight when Ohio Edison Company dropped an official hint that its parent company, Commonwealth & Southern, planned such a course.

Ohio Edison's statement came in a supplemental statement to the S.E.C. with respect to its $43,963,500 proposed first mortgage bond issue. Its reference to the utility act, which only by implication holds forward Commonwealth & Southern as one likely to force the test, follows:

"Registrant is informed and believes that various methods of testing the constitutionality of the Public Utility Act of 1935 are under consideration, and that litigation may be initiated before or shortly after the effective date of this registration statement, affecting either the said Commonwealth & Southern Corporation or the registrant, or both."

The Orange and Rockland Electric Company of Monroe, N. Y., has registered as a holding company with the Securities and Exchange Commission, the first to take that step under the Public Utilities Act of 1935.

While the Federal Power Commission, carrying out its "rule of reason" policy, has leaned far backward on its deadline for filing applications by interlocking directors and officers of utility companies and financial institutions, less than a thousand requests for exemption from the provision of the utilities act forbidding the practice of serving more than one company have been received. The commission has no power to alter the closing date for receiving formal applications, set by the law at 60 days after it went into effect, on October 25. However, the commission, following income tax precedent, continued to accept applications after that time on the ground that the postmark date determined the time of filing with the government, and even hinted unofficially that postmarks would not be scrutinized too closely provided the applications arrived within a reasonable period.

No positive count of the number of officers and directors affected by the law has been made, but it is estimated that the number of hold-outs exceeds the number of applications for exemption.

Government charges collusion

Dismissal of a court test of constitutionality of the Utility Holding Company Act was asked by the government in a brief charging collusive co-operation between some persons interested in the case. The government stand presented to the Federal District Court in Baltimore alleged that petitions prepared by trustees of the American States Public Service Company and a creditor, on one side, against Burco, Inc., another creditor, on the other side, "must have been prepared in close collaboration."

Another utility contests act

Trustees for the Central West Public Service Corporation, now seeking reorganization under the National Bankruptcy Act, challenged the constitutionality of the act in the Federal District Court in Wilmington, Del. The petition asks Judge John P. Nields to pass on the constitutionality of the act, and if he finds it unconstitutional to enjoin the corporation from registering with the Securities and Exchange Commission as required by legislation.

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Cooper's Quoddy Rights Ceded to Government

Terms of an agreement between the War Department and Dexter P. Cooper have been announced by which the government obtains all rights, franchises, plans, data and equipment pertaining to

the Passamaquoddy hydro-electric tidal development belonging to Mr. Cooper and to Dexter P. Cooper, Inc. In return, Mr. Cooper and the corporation will be paid $60,000.

A report that the Army Engineers had been ordered not to award any contracts at Passamaquoddy until the Maine Legislature should create a Power Authority to operate the plant after completion was denied at the office of the Chief of Engineers.

The $10,000,000 allotment for the project was reduced recently by $5,000,000. This was the largest of the cuts made to release additional funds for the Works Progress Administration.

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Cities Service Cuts Doherty Control

Announcement was made by the board of directors of the Cities Service Company last week of the redemption of the entire issue of 1,000,000 shares of 5 per cent non-cumulative stock sold to Henry L. Doherty & Company in April, 1929. The stock was redeemed at $1 a share, the price at which it was sold, in accordance with the charter provision. As a result the voting interest owned by Doherty & Company, directly and through subsidiaries, and by officers and directors of Cities Service, was reduced from 30 per cent to 7.5 per cent.

According to the announcement Mr. Doherty had agreed to the redemption of the 1,000,000 shares at the request of Cities Service's directors. "The redemption of this stock in no wise affects the common stock interest which Mr. Doherty holds in Cities Service Company," the announcement added.

Henry L. Doherty personally owns 226,558 common shares in Cities Service Company.

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North American Acts to Drop Large Unit

Will dispose of holdings in utility in capital — Investment covered ten-year period — Consolidated capital and surplus total more than $47,000,000

Steps were taken last week by the North American Company, by the filing of a registration statement under the Securities Act of 1933, to divest itself of control of the Washington Railway & Electric Company, which, with its subsidiaries, furnishes electric energy and transportation to the nation's capital and a restricted area in Virginia and Maryland. A statement by J. F. Fogarty, president of the North American Company, follows:

"The North American Company is the owner of 12,827 shares of the preferred stock and 62,197 shares of the common stock of Washington Railway & Electric Company, which in turn owns the entire common stock of Potomac Electric Power Company. Washington Railway & Electric Company also owns 50 per cent of the capital stock of Capital Transit Company, and an additional 1.26 per cent of the stock of the latter company is owned by the North American Company.

"Under the terms of the registration statements filed October 31 with the Securities and Exchange Commission under the Securities Act of 1933, as amended, the outstanding 65,000 shares of common stock of $100 par value of Washington Railway & Electric Company are being registered. Simultaneously under the Securities Act there are being registered 1,625,000 participating shares (on the basis of one participating share for each 1/25 of a share of common stock). After the registration statements have become effective the North American Company proposes to sell to underwriters for public offering the 1,554,925 participating shares applicable to its holdings of common stock of Washington Railway & Electric Company. The remaining 2,803 shares ot outstanding common stock of the Washington company, which are in the hands of the public, may from time to time be deposited and participating shares issued against them.

"The effect of these transactions will be the disposal by the North American Company of its entire holdings in the common stock of the company controlling the electric and the principal transportation utility properties in the District of Columbia and adjacent territory in Virginia and Maryland. Its voting power in Washington Railway & Electric Company will then be reduced to 8.55 per cent, represented entirely by preferred stock. The North American Company has had a continuous investment in these properties for more than ten years, and it has been instrumental in promoting their growth. During that period the number of electric customers of the Washington Company's electric subsidiaries has increased from 89,638 to 167,310 and annual sales from 256,808,000 kw.-hr. to 597,621,000 kw.-hr., while the consolidated capital and surplus applicable to the common stock of the Washington company has increased from $16,447,908 at June 30, 1925 to $47,545,477 at September 30, 1935."

Simultaneously with the filing of a registration statement for public sale of the Washington Railway stock, William F. Ham, president, announced his resignation.

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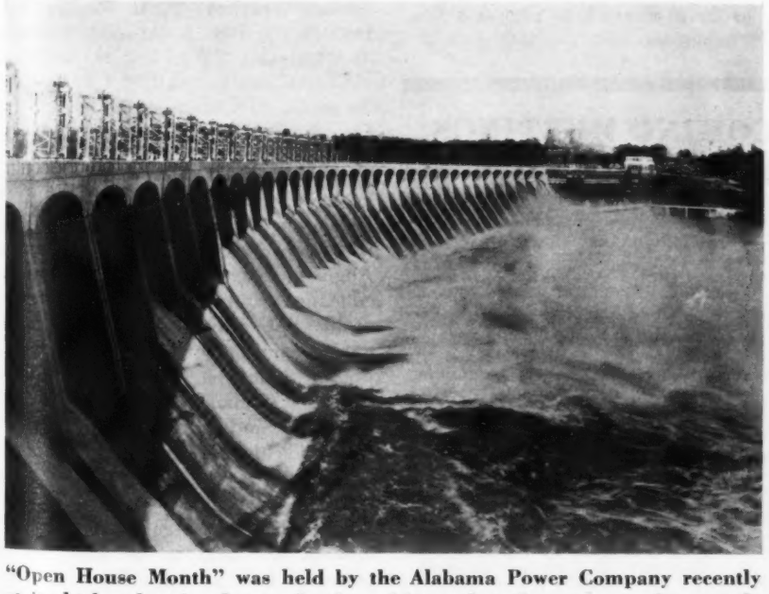
Associated Consolidates Three Sub-Holding Units

Consolidation of three sub-holding units of the Associated Gas & Electric Company, including the Mohawk Valley Company, Rochester Central Power Corporation and the Metropolitan Edison Corporation, has been effected.

The consolidation brings under the company's control important operating properties of the Associated group in New York, Pennsylvania and New Jersey.

MARTIN DAM ATTRACTS THOUSANDS OF VISITORS



"Open House Month" was held by the Alabama Power Company recently at its hydro-electric plants, showing visitors that the company has ample generating facilities to serve the needs of Alabama for years to come. At Martin, Mitchell and Jordan Dams electric kitchens were set up, so that visitors could see how electricity can be used for the more abundant life.

The above illustration shows Martin Dam on the Tallapoosa River.

Ickes Lifts Deadlock on Municipal Power Plants

Scenting a deep-laid plot to cripple municipal power plant construction by stalling P.W.A. aid in the courts until after the December 15 deadline for awarding contracts, P.W.A. Administrator Ickes has announced that no allotments for municipal power plant construction will be rescinded, deadline or no deadline. This action was acquiesced in by W.P.A. Administrator Hopkins.

To date P.W.A. has loaned $17,339,016 and granted $11,544,554 to 92 existing and 83 new municipal electric systems. Court actions brought by privately owned utilities blocked, more or less temporarily, 28 of these. The final word will not be said until one of these is decided by the U. S. Supreme Court, and the only case to progress that far, Kansas Utilities Company vs. Burlington, Kan., was withdrawn by the company before arguments were heard.

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World Power Conference Organization Announced

Organization of the World Power Conference, third plenary session, to be held in the United States next September, has been completed and the following names have been released for publication:

Honorary President—Franklin D. Roosevelt, President of the United States; Honorary Vice-President and Chairman of the American National Committee—Harold L. Ickes, Secretary of the Interior. Chairman of the Conference and Vice-Chairman of the American National Committee—William F. Durand, Palo Alto, Calif. Chairman of the Executive Committee—Morris L. Cooke, Rural Electrification Administration. Director—O. C. Merrill, consulting engineer, Washington, D. C. Executive Secretary—Joel David Wolfsohn, National Power Policy Committee, Interior Building, Washington, D. C.

Executive Committee—Chairman, Morris L. Cooke; C. W. Appleton, vice-president General Electric Company; Floyd L. Carlisle, chairman of board Niagara Hudson Power Company; Frank D. Comerford, president Edison Electric Illuminating Company, Boston; Gano Dunn, president J. G. White Engineering Corporation; Robert H. Fernald, dean Towne Scientific School, University of Pennsylvania; A. C. Fieldner, chief engineer Experiment Station Division, Bureau of Mines, Washington, D. C.; Daniel C. Green, trustee Middle West Utilities Company; David E. Lilienthal, director Tennessee Valley Authority; William McClellan, president Potomac Electric Power Company; Frank R. McNinch, chairman Federal Power Commission; Gen. Edward M. Markham, Chief of Engineers, War Department, Washington, D. C.; O. C. Merrill, consulting engineer, Washington, D. C.; I. E. Moultrop, consulting engineer, Boston, Mass.; T. W. Norcross, chief engineer Forest Service, Department of Agriculture, Washington, D. C.; Richard Southgate, Chief of Protocol, State Department, Washington, D. C.; C. E. Stephens, vice-president Westinghouse Electric & Manufacturing Company, and Joel David Wolfsohn, executive secretary National Power Policy Committee, Washington, D. C.

The executive committee will be in active charge of the planning and carrying out of the conference, subject to the general direction and approval of the American National Committee, which will be composed of the executive committee and approximately 80 additional representatives of the utilities, including coal, oil and gas producers, the professional societies and others.

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Russia Plans Huge New Power Plant

Soviet Russia is ready to start building its second great electric power plant, exceeding Boulder Dam in size and capacity. The new project calls for the construction of a dam across the Volga at the little town of Kamyshin, about 100 miles south of Saratov. The Volga at this point is about 2 miles wide. The power station, on which work is to begin next spring, will have 26 turbines, each of 60,000 kw., with a total annual production of 9,000,000,000 kw.-hr. From present indications much of the electrical equipment and, perhaps, some technical advice will be contracted in the United States.

Announcement concerning the new project was timed to be a part of the anniversary celebration of the opening of the huge Dnieper hydro-electric station three years ago. At the time it was completed this was the largest artificially constructed hydro project in the world. Col. Hugh L. Cooper of New York supervised the construction. Turbines for Dnieperstroy came from the Newport News Shipbuilding & Drydock Company. General Electric supplied most of the generators, as part of a $26,000,000 contract.

COMING MEETINGS

Wisconsin Utilities Association — Technical and operating section convention, Northland Hotel, Green Bay, Wis., November 11-12.

Arkansas Utilities Association—Annual convention, Arlington Hotel, Hot Springs, Ark., November 25-26. R. E. Ritchie, secretary-manager, Arkansas Power & Light Company, Little Rock, Ark.

American Physical Society — Johns Hopkins University, Baltimore, Md., November 29-30. W. L. Severinghaus, secretary, Columbia University, New York, N. Y.

American Society of Mechanical Engineers—Engineering Societies Building, New York, N. Y., December 2-6. C. E. Davies, national secretary. 29 West 39th Street, New York, N. Y.

American Engineering Council—Annual meeting, Washington, D. C., January 9-11. Frederick M. Feiker, executive secretary, 744 Jackson Place, Washington, D. C.

American Institute of Electrical Engineers—Winter convention, New York, N. Y., January 28-31. H. H. Henline, national secretary. 33 West 39th Street, New York, N. Y.

Great Lakes A.I.E.E. Crowds Purdue

"It can be proved beyond the shadow of a doubt that the American people in the most prosperous times we have known have realized less than 10 per cent of what it is really possible for them to enjoy," J. W. Esterline, head of the Esterline-Angus Company of Indianapolis, told the Great Lakes Section of the American Institute of Electrical Engineers at the opening session of the fifth district convention at Purdue University, October 24-25. Mr. Esterline was describing the engineering approach to the labor problem as exemplified in the profit-sharing system of his own company. Another indication that the engineer is realizing his extra-professional responsibility was contained in the address of E. B. Meyer, president of the institute, who said that the day was past when the engineer could brush from his consideration all matters other than those purely technical.

At the regular meeting of the district executive committee a resolution was passed urging the board of directors of the institute to raise again for consideration the matter of the institute's participation in the development and promulgation of a set of principles to guide a rational federal public works program. K. A. Auty, Commonwealth Edison Company, Chicago, and F. H. Lane, Byllesby Engineering & Management Corporation, were re-elected treasurer and member of the national nominating committee respectively. The district co-ordinating committee was given a new personnel with J. H. P. Douglass, Marquette University, chairman; H. P. Seelye, Detroit Edison Company; F. H. Rogers, Lewis Institute, and S. S. Atwood, University of Michigan.

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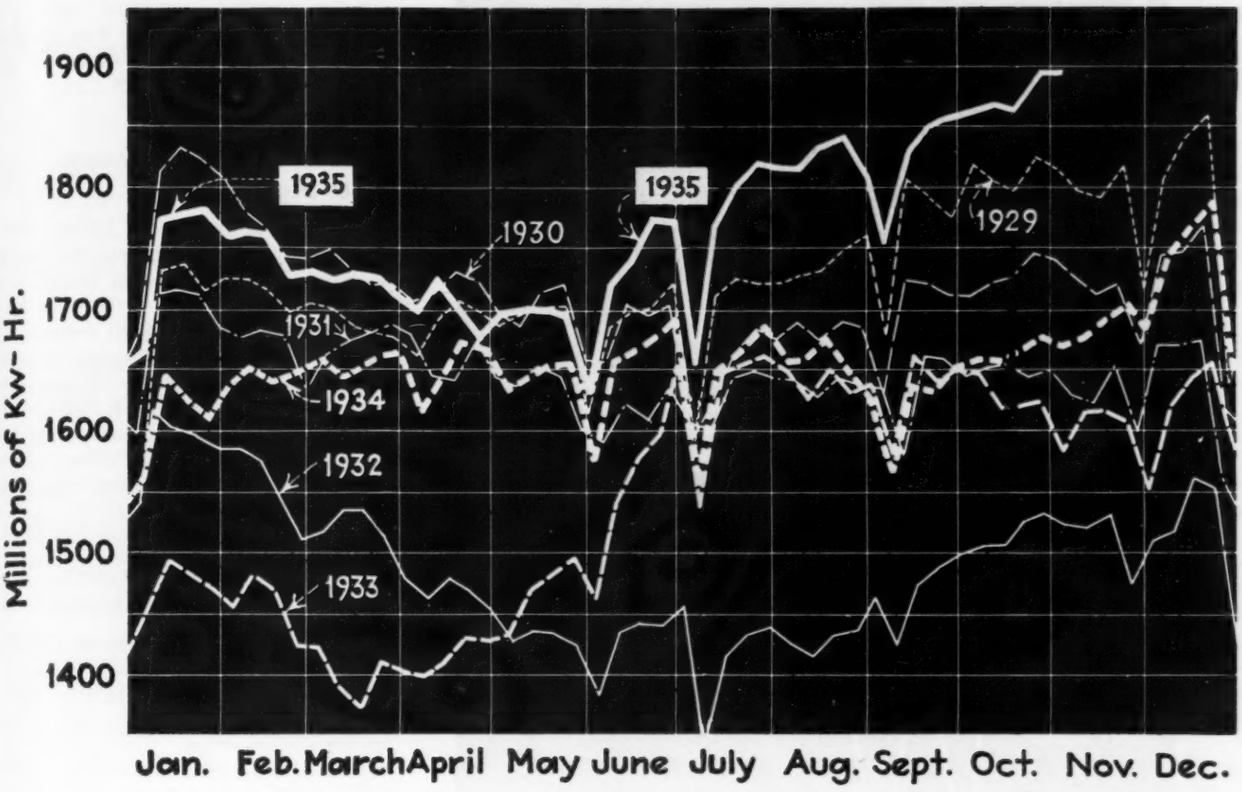
Quebec Commission Named

Appointments to the Quebec Electricity Commission, provided for under legislation enacted at the last session of the Legislature, have been announced. Augustin Frigon, director of technical education of the province and principal of the Polytechnic School, Montreal, is named chairman; Olivier Lefebvre, at present chief engineer of the Quebec Streams Commission, is named vice-chairman, and J. W. McCammon, civil engineer, also of Montreal, a commissioner, in an order-in-council passed last week.

The powers and scope given the commission are held to be wide. It has power to hold all inquiries it may wish into the electricity services in the province, particularly as regards quality of service, equipment, means of protection, conditions and practices affecting the rates.

Output Overshoots Previous Records



With a production of 1,897,180,000 kw.-hr., according to the Edison Electric Institute, the output of central stations during the week ended November 2 rose to the highest figure ever attained in any week. It slightly exceeded that of the preceding week, which in turn had shown a jump of 1.6 per cent over the best previous record, set a fortnight earlier. The output is not only well ahead of both 1934 and 1929 but is increasing its lead. The excess over the like period of last year has grown to 13.7 per cent and over the corresponding week of 1929 to 4.5 per cent. A month ago production matched the peak of the winter of 1929; now it is 2 per cent higher, with the season's maximum yet to come.

Regional returns are characterized by the same features as in the recent past. In percentage gains over 1934 the Rocky Mountain states still head the list. The Central industrial area is next, up 18.7 per cent and still rising. New England and the Pacific region also are above the national average.

Weekly Output, Millions of Kw.-Hr.

1935	1934	1933
Nov. 2...1,897	Nov. 3...1,669	Nov. 4...1,583
Oct. 26...1,896	Oct. 27...1,677	Oct. 28...1,622
Oct. 19...1,863	Oct. 20...1,668	Oct. 21...1,619
Oct. 12...1,867	Oct. 13...1,657	Oct. 14...1,619
Oct. 5...1,863	Oct. 6...1,659	Oct. 7...1,646
Sept. 28...1,857	Sept. 29...1,649	Sept. 30...1,653

Per Cent Change from Previous Year

Region	Week ended Nov. 2	Oct. 26	Oct. 19
New England.....	+14.1	+12.7	+12.6
Middle Atlantic.....	+10.7	+ 7.5	+ 7.4
Central Industrial...	+18.7	+18.5	+16.8
West Central.....	+10.4	+10.5	+13.6
Southern States.....	+ 8.7	+ 6.8	+ 5.3
Rocky Mountain....	+26.0	+26.7	+25.8
Pacific Coast.....	+14.7	+12.0	+ 8.0
United States.....	+13.7	+13.0	+11.7

Highest September Output

Public utility power plants generated more energy in September than in the like month of any other year. The total of 8,218,000,000 kw.-hr., as reported by the U. S. Geological Survey, was 14 per cent ahead of 1934. The margin over that year has been steadily increasing since May, when it was only 4 per cent, and during each of the three summer months it was larger than in any month of last year.

The daily average for the month decreased about 1 per cent from August, whereas the normal change is an increase of about 1 per cent. Water power contributed 37 per cent of the total, against 39 per cent in August and 43 per cent in July. Decreased stream flow again reduced the daily average compared with the preceding month.

Exceptional gains over last year are again reported for the Mountain States, metal-mining region. The Southeast, Middle West and New England also did better than the national average.

Regional Gains Over 1934, per Cent

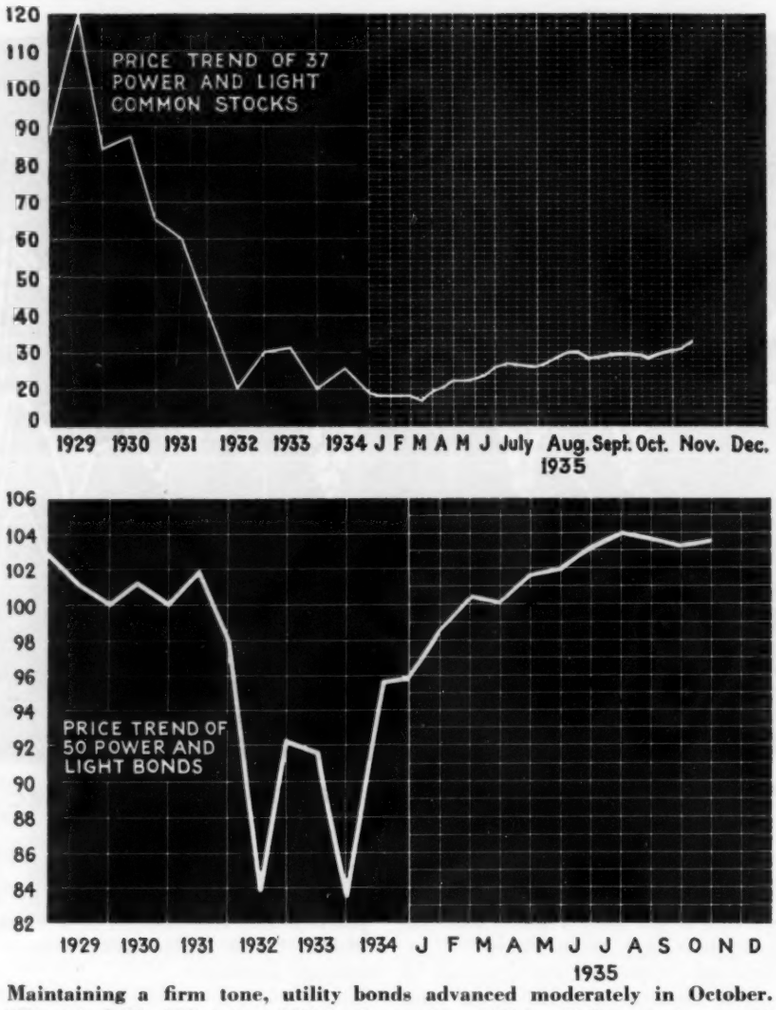
	May	June	July	Aug.	Sept.
United States.....	+ 4	+ 5	+10	+11	+14
New England.....	+ 3	+ 8	+10	+ 7	+16
Middle Atlantic...	+ 3	+ 4	+10	+ 8	+ 9
E. No. Central....	+ 3	— 3	+ 7	+12	+14
W. No. Central...	+15	+18	+15	+11	+16
South Atlantic....	+ 7	0	+ 8	+18	+26
E. So. Central....	+ 4	+28	+21	+ 3	+13
W. So. Central....	+ 5	0	+ 6	+ 6	+ 8
Mountain	+15	+35	+36	+41	+40
Pacific	— 2	+ 7	+ 6	+ 9	+11

World's Largest Turbine Ordered

The largest steam turbine and generator ever built—a 40,000-kw., 1,250-lb., 925-deg. unit—has been ordered from the General Electric Company by the Appalachian Electric Power Company for its Logan, W. Va., plant, American Gas & Electric Company announces. The turbine will operate at a higher temperature than any heretofore built in the United States and the generator not only will be the largest ever built for 3,600 r.p.m., but will also be cooled by hydrogen instead of air.

Completion of the installation, with attendant steam generation equipment, is expected in 1937.

Utility Stocks and Bonds Advance



Maintaining a firm tone, utility bonds advanced moderately in October. "Electrical World" index, 103.8; September, 103.4. Utility stocks moved forward during the past week. "Electrical World" index, 32.7; last week, 31.9.

New Utility Issues

First mortgage and collateral trust bonds of the Columbus Railway, Power & Light Company to the amount of $26,000,000 have been offered the investing public at 101½ and accrued interest as part of a refunding operation to simplify the company's debt structure. The net proceeds will be applied to retiring three bond and note issues aggregating $19,542,000, the purchase of $5,000,000 general mortgage 5 per cent bonds of the company's principal subsidiary, the Southern Ohio Electric Company, which bonds are to be pledged under the new mortgage, and for additions to working capital or reimbursement of the company treasury.

A new issue of $7,300,000 Blackstone Valley Gas & Electric Company mortgage and collateral trust, series C, 4 per cent bonds, was also offered last week at 102½ per cent and accrued interest. Proceeds will be used to retire outstanding securities and to reimburse the company for part of the purchase price of the assets of its former subsidiary, the Pawtucket Gas Company of New Jersey.

Public offering has been made of 235,225.4 shares of preferred stock of the Cleveland Electric Illuminating Company. The shares are priced at $102.75 plus accrued dividends from October 1 to date of delivery. The offering consists of 152,817 shares to be purchased from the company and 82,408 shares from the North American Edison Company, parent organization, which received them as a result of the recent reclassification of the common shares of Cleveland Electric Illuminating. The latter shares do not represent financing by the Cleveland company.

This week the Monongahela West Penn Public Service Company issued first and general mortgage bonds, 4½ per cent series, due 1960, to the amount of $22,000,000, and 6 per cent debentures, due 1965, to the amount of $7,500,000. Both issues were priced at 100 and accrued interest.

A new issue of $5,500,000 city of Seattle (Wash.) municipal light and power 4 per cent bonds was recently offered at prices to yield 2.50 to 4.10 per cent, according to maturity.

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Boston Edison Directors Vote Stock Issue

Directors of the Edison Electric Illuminating Company of Boston have voted to recommend the issue of 89,146 new shares of capital stock to be offered to present stockholders at $140 a share and in the ratio of one new share to each six now outstanding. Officers of the company have presented to the Department of Public Utilities a petition asking for approval of the new issue. The department took the petition under consideration.

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Two Pacific Gas Mergers Approved by Commission

Two of four Pacific Gas & Electric consolidation applications have been approved by the California Railroad Commission, which reserved the others for further consideration. The applications approved cover the consolidation of assets of Mt. Shasta Power Corporation and the Modesto Gas Company with the Pacific Gas & Electric properties.

The two applications pending cover the Great Western Power Corporation and several subsidiaries and the Sierra & San Francisco Power Company.

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U.G.I. Disposes of Holdings in Baltimore Utility

In a letter to stockholders accompanying the statement of earnings for the period ended September 30, John E. Zimmermann, president of the United Gas Improvement Company, announced that the company had disposed of its entire interest in the common stock of Consolidated Gas, Electric Light & Power Company of Baltimore. At the end of 1934 the company held 30,775 shares of common stock of the Baltimore utility, from which it received annual dividends in that year of $111,330.

New York Metal Prices

	Oct. 23, 1935 Cents per Pound	Nov. 6, 1935 Cents per Pound
Copper electrolytic	9.25*	9.25*
Lead, Am. S. & R. price	4.50	4.50
Antimony	16.375	14.75
Nickel ingot	35.00	35.00
Zinc spot	5.225	5.225
Tin Straits	51.00	51.75
Aluminum, 99 per cent	19—21	19—21

*Delivered Connecticut Valley.

MANUFACTURING AND MARKETS

Substantial Business Pick-up Sustained

Favorable

R.E.A. spurs rural electrification.
Steel and auto output rising.
Appliance sales continue brisk.
Loadings and clearings top 1934.
Conservative swing in state elections.

Unfavorable

Large equipment orders still held up.
Construction volume shows no pick-up.
Utility budget period delays commitments.
Profligate federal spending continues.
Utility tax assessments boosted.

Muir Urges Business to Fight Government Curbs

Declaring the American capitalistic system faces destruction at the hands of "politicians and demagogues," Malcolm Muir, president of the McGraw-Hill Publishing Company, called upon advertisers meeting in Atlantic City last week to lead in a fight by all business against governmental regimentation. Mr. Muir, speaking at the closing convention session of the Association of National Advertisers, said advertising men were the logical persons to conduct a campaign for mass understanding of the dangers in regimentation and collectivism.

Mr. Muir said the "American system," which had made "the average American the envy of the world," was definitely threatened by "legislative tinkerers" who had a propaganda machine supported by taxes that was "the greatest the world has ever seen." It was time, he said, "to marshall against this the ingenuity and brains which have won for the people the comforts and conveniences that personify the system."

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Curtis Lighting Secures Large Industrial Order

Curtis Lighting, Chicago, reports the sale of more than 500 X-ray reflectors with housings, of 750 and 1,500-watt sizes, to a large new steel mill located in Detroit. Spacing 25-ft. centers, height 65 ft. to clear the traveling cranes. Installation is now under way.

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Refrigerator Sales Up

In the first nine months of 1935 more electric refrigerators were sold than in all of the record year, 1934, according to the National Electrical Manufacturers Association, which revealed last week that manufacturers reporting to the association had sold 1,295,274 units up to September 30, compared with 1,046,287 in the corresponding period last year, and 1,264,000 for all of 1934.

Refrigerators sold during the first nine months had a net value of $100,020,782, compared with $87,876,107 in the similar period last year. Total sales in September, including those to Canada and other foreign countries, were 58,105 units, against 42,120 for September, 1934. United States sales were 48,796 against 33,668.

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Oil Burner Sales Double

New orders and sales of oil burners jumped in September to more than double the number of units in the preceding month and in September of 1934. Comparative figures as reported to the Bureau of the Census by 160 manufacturers were as follows:

Month	Orders	Shipments
September, 1935	33,385	31,311
August, 1935	16,955	17,588
September, 1934	16,714	18,133
September, 1933	16,296	16,719
Nine months, '35	107,729	104,701
Nine months, '34	72,915	71,476
Nine months, '33	67,745	63,813

Of these totals, units of the domestic type, used within the United States, constitute about 90 per cent; September shipments in that classification were 23,175 mechanical draft and 4,426 natural draft. Last year's corresponding shipments were 13,818 and 1,236.

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Trial Lamps to Further Better Light-Better Sight

In order that householders may conveniently sample illumination similar to that which is provided by I.E.S. study lamps, the Incandescent Lamp Department of General Electric Company at Nela Park, Cleveland, is making available to utilities an ingenious paper and cardboard counterpart called the "Better Light-Better Sight Trial Lamp."

The trial lamp is sufficiently rugged to support a 100-watt "Mazda" lamp, socket and the six-foot extension cord provided. It is designed to withstand the rigors of at least a week's usage.

The new trial lamp is expressly intended for distribution by utility companies. It is expected that the user, after having tried out the new lamp for several days, will hasten to purchase a genuine I.E.S. Better Sight Lamp.

SAFETY LIGHTING INSTALLED NEAR CLEVELAND

General Electric

Offering greater safety and seeing comfort to the motoring public, a new installation, located about 15 miles southeast of Cleveland, illuminates a 1¼-mile stretch of winding concrete. The new system of safety lighting was installed by General Electric in co-operation with the Ohio Department of Highways.

Allis-Chalmers Earns 61 Cents in Third Quarter

For the third quarter of 1935 the Allis-Chalmers Manufacturing Company reports a net profit of $819,965, or $0.61 a share on common stock outstanding, after all charges including debenture interest, depreciation, and federal taxes, on billings of $11,098,568. This compares with a loss in the similar 1934 quarter of $84,923 on billings totaling $5,794,954.

Bookings for the third quarter amounted to $11,534,807, an increase of $5,747,145 over the $5,787,662 reported in the similar 1934 quarter. Unfilled orders September 30, 1935, aggregated $9,105,788, compared with $8,492,321 on the same date a year ago, and $8,013,859 on December 31, 1934.

The results shown of $1,374,919 for the nine months of 1935 equal $1.03 a share on the common stock.

The September 30, 1935, balance sheet discloses net current assets of $24,922,310, compared with $23,049,723 on December 31, 1934.

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Range Factories Running on Full-Time Schedule

General Electric factories engaged in the manufacture of electric range equipment are running on a full-time schedule. This is the first year in the history of electric range manufacture that a constant production schedule has been maintained from the beginning of the year, according to J. R. Poteat, manager of the company's electric range division.

"More people are engaged in our factories than at any time in history," Mr. Poteat says. "The fact that our production schedule has been constant throughout the year reflects the increased demand for electric ranges. Moreover, we are paying the highest wages in our history, which is reflected in a better class of workmen and in a better product."

During the year, so far, more than $250,000 has been expended for equipment in G. E. range factories, he said.

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Contractors and Utilities Reach Understanding

L. E. Mayer, chairman of the N.E.C.A. joint committee which met with a similar committee of the Edison Electric Institute on September 10, reported to the executive committee that a favorable development of understanding of the mutual problems of electrical contractors and the utilities resulted from the conference. The following resolution of the joint committees which had been adopted at this conference to be submitted to the respective bodies for consideration and ratification was unanimously approved by the N.E.C.A. executive committee:

"It is the opinion of this committee that electrical utilities and electrical contractors each have an economic position in the electrical industry and that each should do everything in its power to firmly establish and sustain the other in its legitimate sphere. There should be established within national and local organizations the definite principles that contractors and utilities should through proper committees continually confer nationally and locally with a view of establishing certain principles of operation that will advance the interests of the electrical industry."

Field Reports on Business

Special reports to ELECTRICAL WORLD reveal some hesitancy in business prior to election day, although general optimism prevails as to resumption of recent steady improvement.

NEW YORK

Despite election day interruption, which will be reflected in moderate declines in several important business indexes, general activity continues at a relatively high level, with competent observers unanimously optimistic for resumption of the recent advance. Sharply increased activity in the automotive industry continues the conspicuous bright spot, while strength in pig iron and higher steel operations at the end of October are contributing factors. Car loadings, which will clearly reflect the election day let-down, continue far ahead of both 1933 and 1934, as do bank clearings, where gains in the last week of October are put as high as 50 per cent in the case of Detroit, where the auto makers' confidence is mirrored. The week's estimated gain in clearings was about 8 per cent, with business activity making the major contribution, as New York, with its financial markets, showed a rise of less than 4 per cent.

The electrical trade continues to share in the general improvement, although failure of construction to score any noteworthy gains continues a disappointment. Nevertheless, appropriation of $1,274,084 by the Rural Electrification Administration has lent substantial encouragement locally. Orders for heavy equipment remain in the "prospective" category, while miscellaneous demand accounts for most of a fairly satisfactory volume.

Copper markets are steady but slow.

•

PACIFIC COAST

Sustained improvement in electrical output is reported in this area, while larger purchasing power in rural territories is reflected in a brisk appliance business. Construction, on the other hand, is lagging slightly after recent monthly gains, but sales of supplies, wire, rope and other staples are reported as satisfactory.

In industry, mining machinery is very active and ahead of last year. Several large modernization awards, as well as the announcement of new plants in California, have contributed to the general optimism which prevails with regard to industrial expansion.

Utility purchases, except those for municipal or federal projects, are confined largely to meters and transformers and other stock items, although manufacturers report these to be moving "fairly well." Award has been made for thirteen metal-clad switchgear units to the Allis-Chalmers Corporation by the city of Pasadena; the recent purchase of material and supplies for the 200-mile transmission line of the Metropolitan Water District and equipment still to be purchased for the Boulder Dam transmission system bulk large in the Southern California business picture.

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NEW ENGLAND

Business is stirring faster in industrial circles, last week producing an increased volume of electrical equipment and supply orders from highly diversified sources. Kilowatt-hour sales are breaking new records, and in some quarters utilities have begun active work upon plant modernization to insure full rated capacity under all controllable conditions; in fact, steps are being taken in some areas to increase capacities through improved apparatus. Domestic appliance sales are rising and some wholesalers report a shortage in some lines.

A marine cable order totaling about $25,000 has been placed with an Eastern manufacturer. Public interest in electrically equipped demonstration homes is very alert, one in Marblehead reporting over 150,000 visitors in ten weeks. About two dozen of these will soon be on exhibition in this territory, and one just opened in Rutland, Vt., features pioneer co-operation between the local industry, banking and governmental interests concerned. In Vermont, 1,883 electric refrigerators had been sold this year to October 16, or 135 per cent over the industry's quota, a gain of 529 units over the same period of 1934. Wiring equipment is moving well and public building projects are absorbing much materials, one recent group totaling $23,000 in a small area. Further contracts for housing are reported from the Quoddy power project in Maine.

A $68,000 handling material job for sewerage service which involves motors and control has come to a head in Connecticut. A new $700,000 high school is to be built at Fitchburg, Mass., with modern electrical equipment, and in Lynn and other eastern Massachusetts areas improvement of school house lighting is active, with a trend toward the installation of electronic control of automatic lighting of darkening room corners. An outstanding power plant outlay for additional boiler and auxiliary equipment totaling over $600,000 has been contracted for by the Lynn Gas & Electric Company. A Southern Stone & Webster property is negotiating for a 12,500-kw. steam turbine unit.

Small industrial electric heating appliances are selling more actively for diversified use. Manufacturers' representatives and utility power salesmen are co-operating to adapt this equipment to special applications where rapid heating in concentrated space is essential to more economical and reliable processing. A $6,000,000 federal housing project has reached the bidding stage on foundation work in South Boston, with a good outlook for wiring material and future equipment. At Lawrence, Mass., a 500-hp. water pumping installation equipped with two synchronous motors and representing an outlay of about $12,000 has superseded a municipal steam plant. Industrial steam turbine inquiries are very active. Street lighting projects are also in evidence, with emphasis upon gaseous units.

U. S. Court Holds Utility Act Is Invalid in Its Entirety

Industry Hails Sweeping Character of Decision, Which Asserts S.E.C. Has No Basis for Enforcement of Any Portion of the Law— Judge Coleman Attacks Burns' Charges of Collusion

THE Public Utility Act of 1935 was held invalid in its entirety on Thursday by Federal District Judge William C. Coleman in Baltimore, who called the federal government's attempt at sweeping regulation of holding companies "grossly arbitrary, unreasonable and capricious." The court declared that Congress had "flagrantly exceeded its lawful power."

Judge Coleman, in holding that it was impossible to separate the unconstitutional sections of the act from those portions which are legal, "if any," put an end to fears that lower court decisions might make it possible for the federal government, through the Securities and Exchange Commission, to preserve a basis for enforcement of parts of the law.

In his ruling Judge Coleman instructed the trustees of American States Public Service Company, the plaintiff, to proceed with the reorganization and to treat the Public Utility Act as "invalid and of no effect."

No great surprise was manifested by leading public utility executives over the general views expressed by the court in the decision, many pointing out that the findings were exactly in line with the contentions the industry has made in connection with the act from the very outset. However, there was pleasant surprise expressed at the sweeping character of the ruling in holding the law unconstitutional in its every application.

S.E.C declines to comment

The Baltimore ruling was the signal for a long session of Securities and Exchange Commission members with their counsel, after which it was announced that no formal statement concerning the commission's attitude would be made, at least until there had been opportunity for a closer study of the text of the decision.

The suit was instituted by trustees for the American States Public Service Company, who have been attempting reorganization of the company under supervision of the United States District Court and Judge Coleman for more than a year. The action questioned whether the company should register with the S.E.C. as required under the act, passed at the last session of Congress. Included in counsel for the trustees was John W. Davis, Democratic candidate for President in 1924.

Arrayed on the other side were government attorneys as "friends of the court" and Burco, Inc., a Delaware company organized to represent American States bondholders. Inasmuch as the federal attorneys entered the case only as interested parties, the question of appeal from Judge Coleman's decision was left up to Burco as the actual defendant. Ralph P. Buell, attorney for Burco, promised an appeal.

U. S. charges collusion

Collusion between the trustees, Burco and Dr. Fred Lautenbach, Baltimore dentist and American States stockholder, who entered the case as a defendant, was one of the principal charges in the government brief entered by John J. Burns, former Superior Court judge in Massachusetts and now counsel to the S.E.C. Judge Burns claimed the two apparently contesting groups were attempting only to test the constitutionality of the act, alleged that the same interests which opposed the passage of the Wheeler-Rayburn bill were active in pushing the court fight against the law and urged the court to "proceed cautiously," due to what he called "suspicious circumstances" surrounding the action.

Presentation of this brief evoked a scornful response from Mr. Davis, who declared the document was "below the dignity of a police court." Judge Coleman's decision was almost equally critical of the government's stand, stating, in part:

"It is not forbidden 'collusion' for the parties to a case, by agreement, to put it in such shape that the rights and obligations of the parties can be the more readily determined by the court, especially when matters of public moment are involved requiring speedy settlement, regardless of an adverse effect upon the government's interest. . . . The attempt on the part of counsel for the government and for the Securities and Exchange Commission to disparage the motives of both intervenors and their counsel is not only baseless, but unworthy of any representative of any branch of our government. . . ."

Judge Coleman took sharp issue with the government's argument of "public interest," declaring that if this plea were allowed to prevail in the present case it "might be advanced with far greater force with respect to most other business activities, with the result that nothing would be left to state or local autonomy under the Constitution" and that "the Tenth Amendment would become a myth."

While admitting some of the evils of the holding company system as advanced by Senator Burton K. Wheeler at the time of the act's passage, the decision continues:

"It is believed that enough has been said to make it clear that this court is not to be controlled by other than strictly legal questions. . . . As has been explained at great length, every exercise of Congressional power must find its justification in some authority delegated by the Constitution. If such authority is lacking, then it matters not how impotent or unwilling the states may be or appear to be, with respect to the desired ends. Congress may not interfere.

Court assumes abuses exist

"Furtherfore, it may be assumed that for the purpose of supporting such overcapitalized security structures, those holding companies have often been under pressure to obtain the maximum possible revenue out of their subsidiary operating companies; that they have often resisted voluntary rate reductions which might strengthen their subsidiaries by increasing the consumption of gas and electricity . . . and that there has often been brought under common control widely distant and unrelated utility facilities in flagrant disregard of economic management and the integration and coordination of properties. . . .

"Nevertheless, repeating and summarizing what we have said, 'a national public interest' only exists under the Constitution so as to permit of federal regulation when the person, company or thing affected with a 'public interest' is, in fact, involved directly, not indirectly, in activities over which the federal government, through one or more of the powers delegated to it by the Constitution, has jurisdiction."

Pacific Coast Conclaves Probe Industry Problems

Continuing the policy established last year of acting as an all-industry forum for the discussion of engineering and commercial problems, the Pacific Coast Electrical Association opened the 1935-36 program with meetings held in Los Angeles and San Francisco during the last two weeks in October. Under the leadership of F. O. Dolson, vice-president of the Southern Sierras Power Company and president of the association, the meetings were thrown open to the presentation of the problems which each branch of the electrical industry wanted considered for counsel and action by the electrical industry as a whole.

At the business development section meeting in Los Angeles, October 17, W. C. McWhinney, Southern California Edison Company and chairman of the section, led the discussion. Speaking for the manufacturers H. H. Fogwell, Thermador Electrical Manufacturing Company, asked: "How can all employees of the electrical industry promote selling and load building and thereby promote their own welfare?"

George Black, electrical contractor of San Bernardino, led a spirited discussion of the contractor's problem in present-day business, during which time such questions as "What is the electrical contractor's place in industry sales plans?" "What about the encroachment by utilities in the field of the contractor?" "How can the contractor-wholesaler relationship be improved?" and "How can the problem of the contractor buying direct from the manufacturer be eliminated?" were asked.

Representing the utilities, P. P. Pine, San Diego Consolidated Gas & Electric Company, asked the following questions: "What can the electrical industry do to popularize the use of electrical table appliances in the home?" "How can the five branches of the industry profit to the fullest extent from the funds being expended by the utilities in sales promotion?" "How can the public be convinced that rates are low?" and "What are the utilities going to do about the challenge of surplus power?"

The northern section of the business development section met in San Francisco October 24, with A. H. Nicoll, Graybar Electric Company and vice-chairman of the section, presiding. After greetings by President Dolson and Past-President Arthur Markwart, the problem of the motor manufacturers was presented by Kurt Steindorff of General Electric Company. This was followed by a paper on Apparatus Manufacturers' Problems, presented by Jerry Rosenblat, Westinghouse Electric & Manufacturing Co.

A noon luncheon, at which more than 250 were in attendance, was addressed by Dr. G. W. Allison, sales director Edison Electric Institute, who pointed out the responsibility of every one in the electrical industry to defend American methods and principles of doing business.

At the two meetings of the operating economics section, one held in Los Angeles under the leadership of K. B. Ayres of the San Diego Consolidated Gas & Electric Company, and one in San Francisco under the leadership of A. W. Copley of the Westinghouse Electric & Manufacturing Company, the following problems were presented: "How and what types of new load can be added to existing facilities?" was presented by A. S. Glasgow, San Diego Consolidated Gas & Electric Company, and "What are the economical limits of continuity of service?" by G. M. Babcock of the Los Angeles Gas & Electric Corporation and C. N. Parker of the Southern Sierras Power Company, Riverside.

The foregoing problems will be reviewed by the guidance committees of the two sections and from them will be prepared four problem papers for the business development section and four problem papers for the operating economics section, which will be presented to the membership at large for solution in a prize contest. The problem papers will be published in the December issue of *Electrical West,* at which time announcement of the contest will be made.

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Aurora Dam Rights Transferred to T.V.A.

Southern Industries and Utilities, Inc., has withdrawn its application filed with the Federal Power Commission concerning the Aurora Dam on the Tennessee River, near the Kentucky-Tennessee line. This action was taken with the concurrence of the Tennessee Valley Authority, to which the applicant has transferred its rights, recently valued by the commission at $156,490. Although not scheduled for immediate construction, a dam at or near the Aurora site is part of T.V.A.'s plan for ultimate development of the river.

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Gross Receipts Tax Applied to Utility Mercantile Sales

Power companies engaged in mercantile operations in Virginia must pay the gross receipts tax on these operations, the state Corporation Commission has ruled in a test case brought by the Virginia Gas Distribution Corporation.

The opinion, by Chairman Thomas W. Ozlin, denied the gas company's claim that the tax was unconstitutional because it amounted to double taxation for the same privilege. It sustained an important provision of the 1934 tax bill and saved revenues totaling more than $50,000, since all the major power companies selling appliances in Virginia had filed supporting petitions. These included the Virginia Electric & Power Company, which has successfully challenged the 1933 franchise tax and forced a rewriting by the 1934 General Assembly.

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Rate Terms Compiled by Power Commission

Confusion in terminology used in electric rate schedules and contracts throughout the United States has led to the preparation of a glossary of 161 definitions by engineers and accountants of the Electric Rate Survey now being conducted under the direction of the Federal Power Commission. This is being checked by a selected group of utility and regulatory officials, engineers and other experts for criticism before publication.

Need for a glossary developed during the study of reports from virtually every operating utility within the United States. It was found that there is no community of understanding regarding numerous terms used in rate schedules and contracts, although the amount of the customer's bill was often materially altered by the interpretation of a term to which no definite meaning could be assigned. Although prepared primarily for its own use, the survey believes that publication of the glossary will help to eliminate the confusion prevailing in rate and power terminology.

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More Oil Burners

Shipments within the United States of domestic oil burners of the mechanical draft type in August were 33 per cent greater this year than last, 12,493 against 9,371, and they jumped 58 per cent over the 7,914 of July. The Bureau of the Census announces these figures on the basis of reports from 160 manufacturers, who produced about 88 per cent of the total value of such products in 1933. Shipments for the eight-month period were far ahead of those in 1933 and 1934. Though not announced separately for this one type, the increase was probably close to that of the total for all types, domestic and industrial—56 and 38 per cent, respectively.

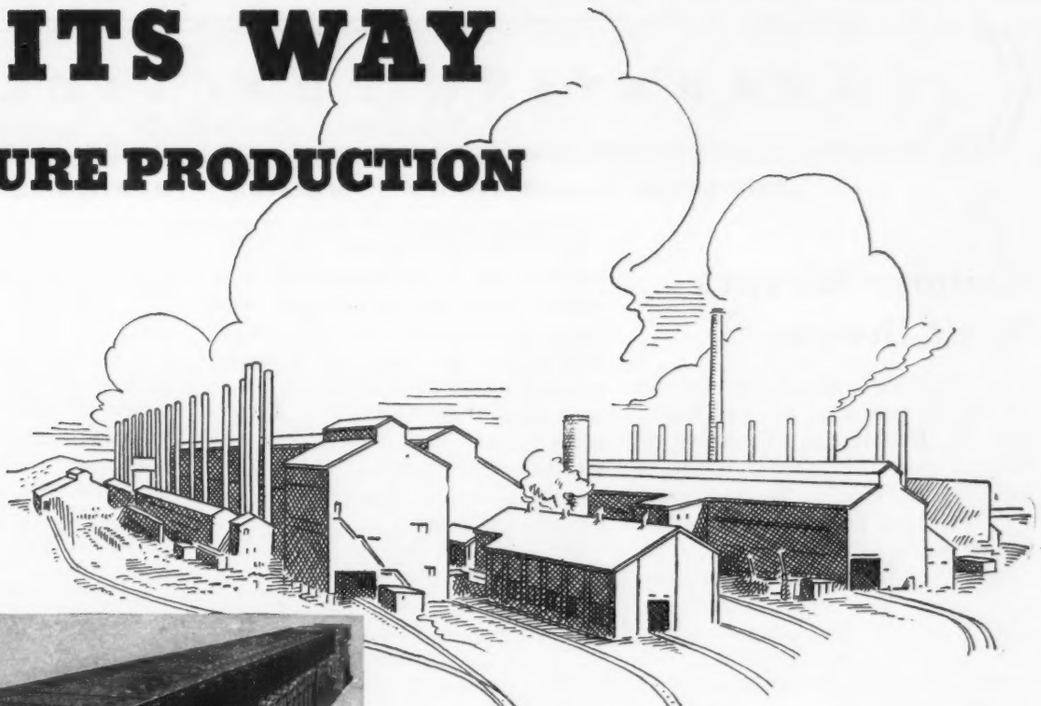
•

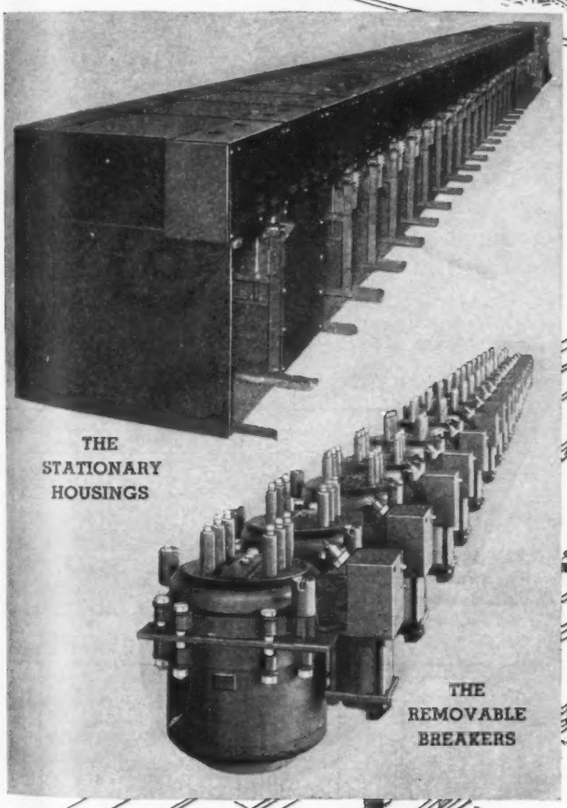
Standard Gas to Keep Assets

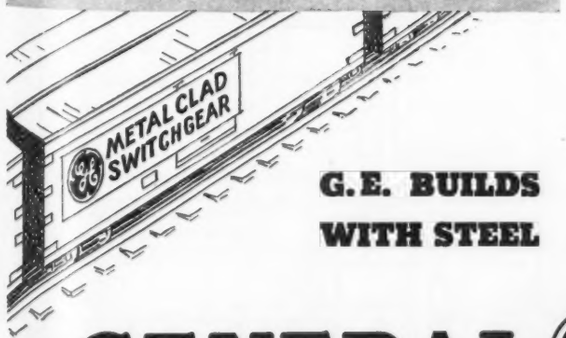
Federal Judge John P. Nields handed down an order continuing the Standard Gas & Electric Company in possession of its assets. The company has filed a petition in bankruptcy seeking reorganization. A hearing was held involving the question of whether the company should be continued in possession of assets or whether trustees should be appointed.

ON ITS WAY

TO INSURE PRODUCTION







G.E. BUILDS WITH STEEL

LITERALLY, trainloads of G-E metal-clad switchgear have been specified by steel-mill engineers in recent months. Its popularity for that industry's heavy-duty switching recommends it also for jobs where the service is less severe. ● Besides improving reliability of operation, G-E metal-clad gear will reduce your system investment. Being shipped assembled, it simplifies the problems of planning and design. It offers an ideal way to modernize old stations. It also provides the safest of all switching arrangements. Discuss it in greater detail with your G-E representative. General Electric Company, Schenectady, N. Y.

860-10

GENERAL ELECTRIC

Uniform Network Vault Design

In building network vaults for downtown customers of the Edison Electric Illuminating Company of Boston, preferred practice utilizes a layout conforming to the accompanying drawings, fireproof construction being employed throughout. J. F. Maxwell of the company's electrical engineering department points out that, in general, inlet and outlet ducts are provided in the outside wall with balanced-trigger-type automatic louvers which close instantaneously when any violent pressures are set up within the vault, or when high temperatures melt the fusible links supporting the louvers. Forced ventilation is sometimes required and the ventilation of transformer and protector rooms is independent, natural draft being relied upon in the latter.

An oil sump tank with capacity equal to that of one transformer is installed under the transformer room floor, which pitches toward two drains leading to the tank. Transformer room doors are framed and hinged to open inward, in order to prevent their being forced outward in the event of a transformer explosion, which might permit smoke and fumes to be blown into the building.

Oil-insulated transformers have been used in all installations except one recently completed for William Filene's Sons Company.

In this store 600-kva. transformer units have been provided, and the use of "inertol" instead of oil has enabled the vault to be designed without a fire wall to keep transformers and protectors apart. The Boston secondary network is of the 120-208-volt class, and in the design for the new installation for the Filene store provision is being made for an ultimate demand of about 2,000 kva. To handle the large future currents anticipated, it was found necessary to install copper tubing of 3-in. iron pipe size, using two tubes for each phase in the bus and two per phase for the single service from the bus to the customer's service circuit breaker. Mechanical stresses on the bus supports caused by the high short-circuit current values possible were found to be such that the use of porcelain insulators was discarded, 2-in. thick ebony asbestos supports being employed instead.

The reduction in size of transformers effected by the use of this new insulating medium in the Filene installation, together with the elimination of the fire wall, has resulted in a saving of about 30 per cent in vault dimensions when compared to those required for oil-filled units.

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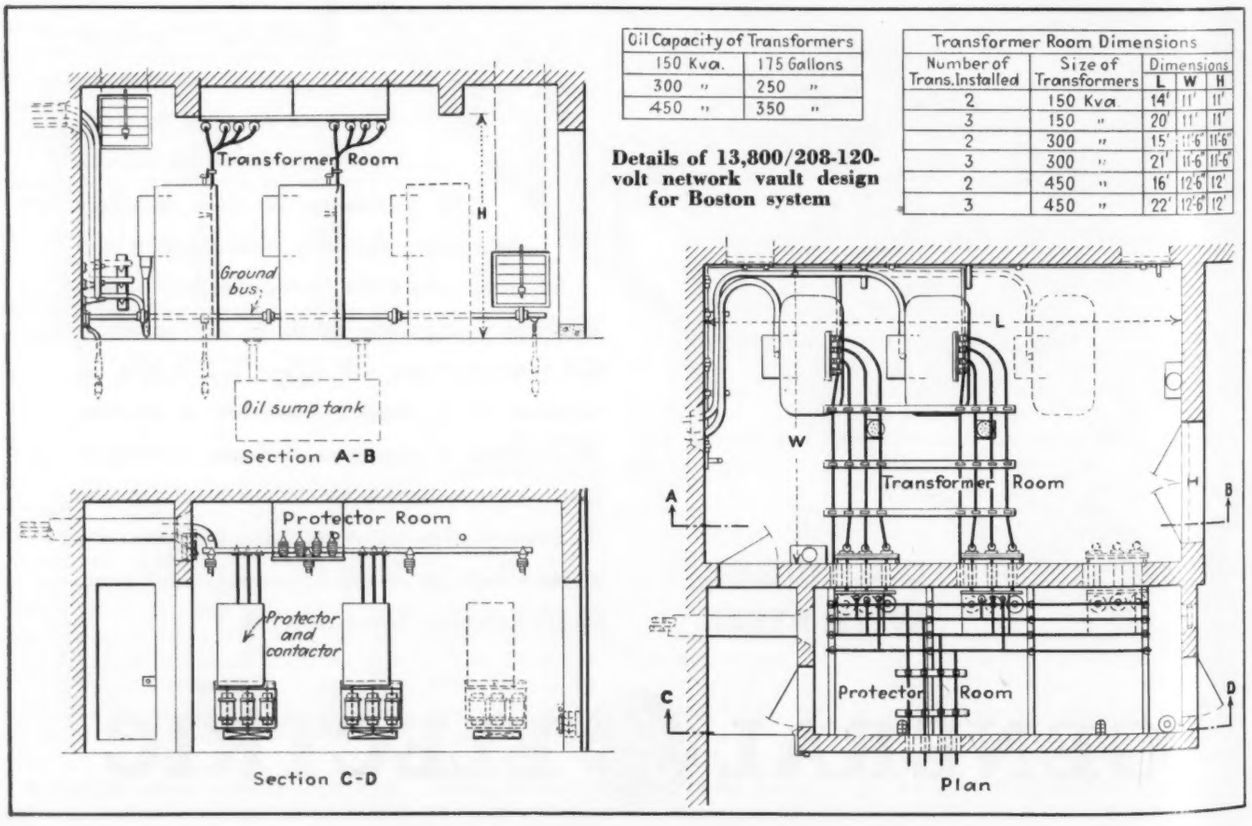
Arresters Save Insulation Cost

To provide 30,000 kva. in step-down capacity at Newcomerstown substation the Ohio Power Company desired to utilize one old transformer supplemented by two new units. However, with increased transformer costs it was expensive to buy new units with the same insulation as the older one,

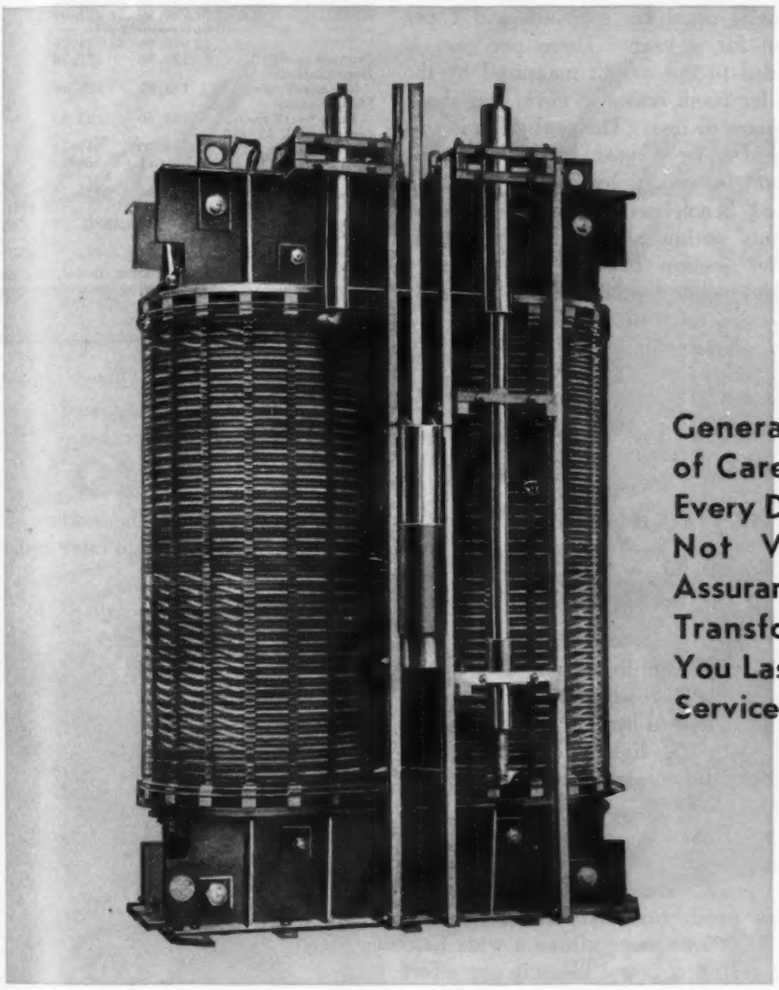


Oil Capacity of Transformers	
150 Kva.	175 Gallons
300 "	250 "
450 "	350 "

Details of 13,800/208-120-volt network vault design for Boston system

Transformer Room Dimensions				
Number of Trans. Installed	Size of Transformers	Dimensions L	W	H
2	150 Kva	14'	11'	11'
3	150 "	20'	11'	11'
2	300 "	15'	11'-6"	11'-6"
3	300 "	21'	11'-6"	11'-6"
2	450 "	16'	12'-6"	12'
3	450 "	22'	12'-6"	12'

YOU PROFIT FROM OUR ATTENTION TO THE THINGS YOU CANNOT SEE



General Electric's Policy of Careful Attention to Every Detail—Whether or Not Visible—Is Your Assurance that G-E Power Transformers Will Give You Lasting, High-quality Service

SINCE its introduction twenty years ago, the concentric circular-coil construction has been a highly important factor in the successful operation of more than 66,000,000 kva of G-E power transformers.

Among the features that are highly important to the user are:

1. **Freedom from corona**
   As the transformer is completely free from corona during insulation tests, the insulation is in perfect condition when the unit is shipped. This assures a high degree of service reliability.

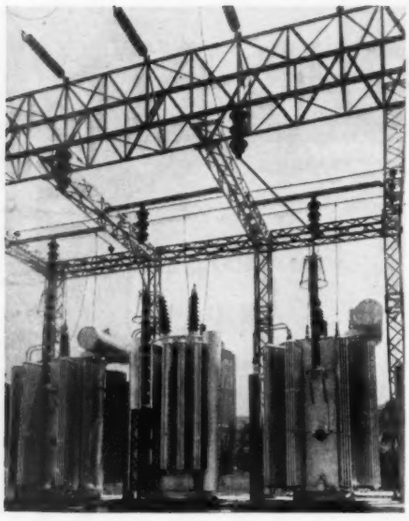
2. **Free passage for cooling oil**
   Thorough ventilation results in evenly graded temperatures from top to bottom of the transformer, and maximum ability to handle emergency loads. In addition, the horizontal coils expand and contract uniformly, thus preserving the high dielectric strength of the insulation.

3. **Exceptional mechanical strength**
   Every turn is supported at regular intervals by radial spacers, which form a group of supporting columns that hold the winding securely in place —even when the transformer is subjected to the most serious short-circuit conditions.

These are important factors in the lasting service, continuity of operation, and low maintenance expense which characterize G-E power transformers. Ask the nearest G-E office for further information, or write General Electric, Dept. 6A-201, Schenectady, N. Y.

310-13

GENERAL ELECTRIC



Integrally mounted lightning arresters on Newcomerstown transformers

consequently the new units were purchased with reduced insulation and both high and low sides were protected with modern arresters co-ordinated with the windings and mounted on the transformers to form a complete unit as shown. Although the cost of the transformers was considerably higher than at the time the old unit was purchased, it was possible to complete the bank with new equipment at a cost per kva. approximately equal to that for the old unit.

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Checking Coal

Improved facilities for checking coal consumption at the generating plant of the Lynn (Mass.) Gas & Electric Company have pointed the way toward reducing the allowance for shrinkage, windage and weighing inaccuracies from 3 to 2.75 per cent after six years' experience, according to a statement by James A. Cook, general manager of the company. One section of the station contains a modern 20,000-kw. turbo-generator supplied with steam from two 400-lb. boilers equipped with automatically registering Richardson scales. An older section has three units, aggregating 17,800 kw., furnished with steam from 200-lb. boilers. The weighing of coal in the older section is by manually-operated scales, accurate in service, but depending on the firemen for the record of fuel fired. Years of experience has shown that it is almost impossible to get a true record from the firemen, who at best are poor accountants.

To ascertain the fuel consumption the aggregate weighings of coal in the two boiler plants are compared monthly with weightometer registrations which record the quantity of coal supplied to the station by the conveyor belt. Agreement within 1.5 per cent is usual for a month and 1 per cent for a year. Three per cent is added to the weight measured by the boiler room scales to cover the above sources of loss. The coal stock is surveyed twice a year by photographic methods, which, by comparison with fixed bench marks, permit measurements within about 500 tons. The older section of the plant is used mainly when the 400-lb. unit normally carrying the station load is off the line for overhaul or other reasons.

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Light-Alloy Body Cuts Truck Cost

A. N. SNYDER
Superintendent of Motor Transportation
Detroit Edison Company.

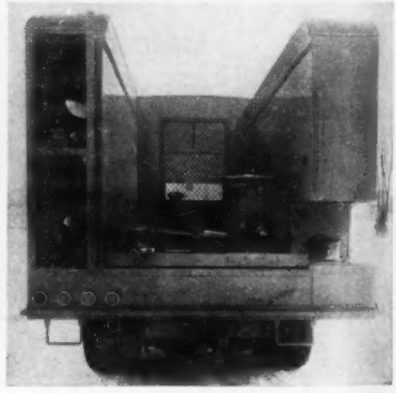
From a gross weight, including full load, of 14,000 lb. to one of 19,000 is not such a broad jump as is apparently indicated by the prices of motor trucks. The lighter chassis can be bought for under $1,000, compared with nearly $2,000 for the heavier one. This is because the lighter chassis is much more commonly used and its price reflects the economies of mass production. A price differential of $1,000 or more allows a wide field for trying out new ideas in the effort to use the lower-priced chassis.

Quite different from the old-time line wagon is the truck shown, and having a light-weight alloy body with a corresponding lighter chassis the saving accomplished by the new design appears in the accompanying figures. It is not intended to offer the truck design here illustrated as the final solution of the problem. Since this unit was built and put into operation certain possibilities of improvement have come to the surface and these will be worked into later designs.

Saving from Light-Weight Line Truck Body

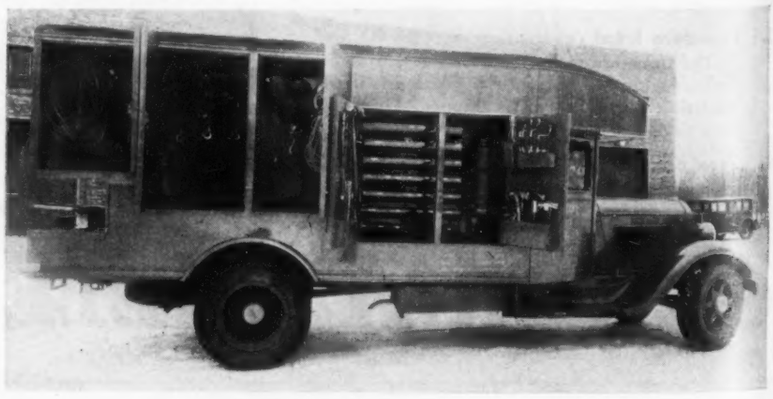
	Alloy Body	Comparable Wood and Steel Body	
Chassis	$950.00	$1,900.00	
Body	1,980.00	1,225.00	
Totals	$2,930.00	$3,125.00	
Interest at 6%	175.80	187.50	
Depreciation—Chassis-5 years	190.00	380.00	
Depreciation—Body*—10 years	198.00	122.50	
License—$1.25/100 lb.	96.25 (7,700 lb.)	131.25 (10,500 lb.)	
Total fixed costs	$660.05	$821.25	
Difference in favor of alloy body			$161.20
Reduction in operating cost (estimated)			200.00
Total annual saving			$361.20

*Being made of non-corroding metal, the alloy body might have been allowed a lesser depreciation rate than the other.



A new idea in line trucks

The body is of light alloy which, with the lighter chassis thus allowed, makes a truck of 3-ton load capacity that weighs only 7,700 lb., against 10,500 for the usual steel and wood body and the heavier chassis required. Closed up, the truck has the smooth appearance of a moving van.



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ON THE WEST COAST • "Very low oil consumption. Remarkably free from oxidation and sludging."
A PLANT IN GEORGIA • "Maintenance costs with Regal Oil have been nil."
FROM THE GULF COAST • "Many years service. Bearings in excellent condition."
A STATION IN VIRGINIA • "Continued low maintenance costs recorded with Texaco Regal Oils."

When a Texaco representative calls, remember that he is there to help your men lower the cost of your lubrication.

•

THE TEXAS COMPANY
135 East 42nd St., New York City
Nation-wide distribution facilities assure prompt delivery.

LUBRICANTS

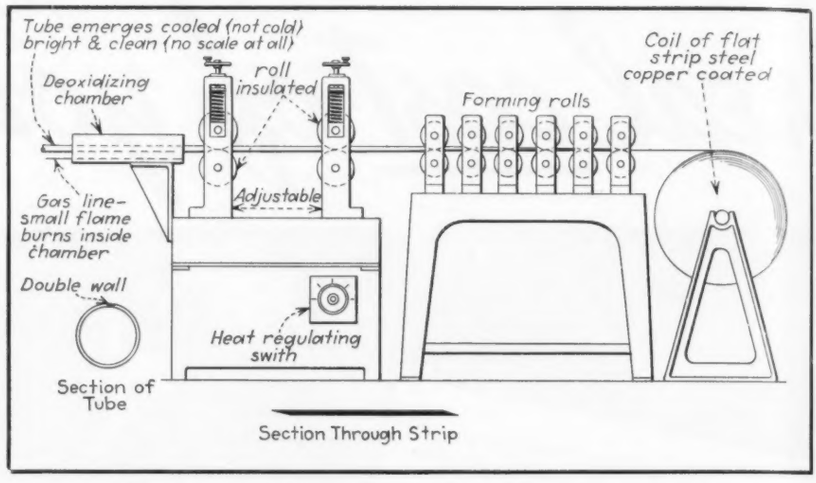
SERVICE TESTED FOR ECONOMY

Electricity Aids Levee Construction

Electric-power-driven tower excavators capable of moving 5 to 14 tons of earth at one scoop are being employed by the Brooks-Calloway Company, Atlanta, Ga., in the construction of earth levees to control the Mississippi River.

These machines are composed of "head" and "tail" towers connected by slack cables which control the scoop. On the job under way near Memphis, Tenn., an excavator of this type is in use which has a head tower 146 ft. high. The "tail" tower, 50 ft. high, stands 1,000 ft. away. A huge 14-cu.yd. square bucket, carried on the slack cableway, runs by gravity from the head to the tail tower. Dropped to earth at this point, it scoops up earth and is dragged toward the levee at the head tower. Under favorable conditions a tower machine of this type can move 10,000 tons of earth in a double shift day. Both towers, being self-propelled, move along the levee as the digging progresses.

Three electric motors, powered from adjacent 4,000-volt lines of the Arkansas Power & Light Company, are installed in a portable power house at the base of the head tower. One of the motors is used for hoisting and the remaining two for dragging the scoop. Aggregating about 1,000 hp., the motors of each machine consume about 200,000 kw.-hr. per month and produce a collective demand of 600 kw. The average rate per kilowatt-hour is approximately 1.6 cents. During the past two years the Arkansas Power & Light Company has furnished power for the construction of 40,000 cu.yd. of new and enlarged levees which have required approximately 36,000,000 kw.-hr. in their construction. At this rate of about 1.44 cents per cubic yard it is not difficult to see why contractors use this type of machine. These excavators are made by the Bucyrus-Erie Company of South Milwaukee, Wis.



Resistance welding equipment used with a heating unit in the continuous fabrication of steel tubing

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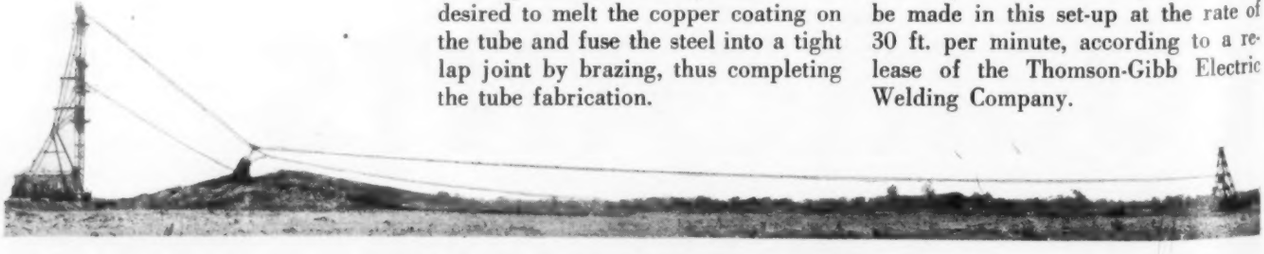
Welding Transformer Used in Brazing

Interesting as an illustration of the uses to which welding equipment can be put is the application of a welding transformer to use with a heating unit in the continuous brazing of steel tubing. It was desired to produce a small copper-plated steel tube from flat strip stock. As the tube emerged from the forming machine as a cylinder it was desired to melt the copper coating on the tube and fuse the steel into a tight lap joint by brazing, thus completing the tube fabrication.

Two pairs of grooved wheels, one wheel of each pair insulated from its mounting, the other two connected to the transformer secondary terminals, constitute the heating unit. Heat is produced by the passage of current through the tube between the uninsulated rolls. The wheels are so arranged that the distance between each pair can be adjusted to suit operating conditions.

The arrangement shown, together with a current regulating switch, provide an infinite variety of adjustments to care for changes in speed and size of tubing. By delivering the brazed tube to a cooling or deoxidizing chamber, made of a section of merchant pipe and heated by a gas flame, the tube emerges cool, clean and free from oxide.

The job, formerly done by means of an electric furnace, is now said to be completed with greater speed and accuracy. A continuous $\frac{5}{8}$-in. tube can be made in this set-up at the rate of 30 ft. per minute, according to a release of the Thomson-Gibb Electric Welding Company.



Tower excavator used in levee construction

Head tower at extreme left, housing electric motor drive, is 1,000 ft. from tail tower shown at right

YOUR LARGEST POWER COSTS *are in your* MANUFACTURING OPERATIONS

A PRECISION metal working plant, for example, in modernizing a 16 automatic-screw-machine department found that direct motor drive cost $6,576 to install, whereas Modern Group Drive cost only $2,688. The saving of $3,888 in installation alone cut the fixed charge cost of delivering power to the machines $583 per year. Modern Group Drive was adopted and this real reduction in power costs has become a new net profit.

Between the meter and the machine avoidable items of production cost are frequently found sufficient to spell all the difference between profit and loss in production. Plainly visible power losses are often the least of these pitfalls. Unless the power transmission system is *exactly* adapted to your production needs, your manufacturing costs are too high.

Do you *know* whether you are applying power to your machines most economically?

3500 Power Transmission Counselors, organized and trained to analyze power wastes and suggest methods of reducing production costs, are at your service, without obligation. Daily, through 60 Power Transmission Clubs in industrial centers, they are cooperating in this work with plant engineers, public utility engineers and consulting engineers. Call them in!

First, however, send for a free copy of the famous Red Book, "A Practical Analysis of Some Fundamental Principles of Industrial Power Transmission." It explains the economic advantages of Modern Group Drive, a product of cooperative industrial research, and gives graphic comparisons with other means of applying power to machines.

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1 ATLANTIC STREET, STAMFORD, CONN.

A research association of producers and distributors of power, power units and mechanical equipment for the transmission of power

MODERN PTC GROUP DRIVE

A POWER DOLLAR SAVED IS A PROFIT DOLLAR EARNED

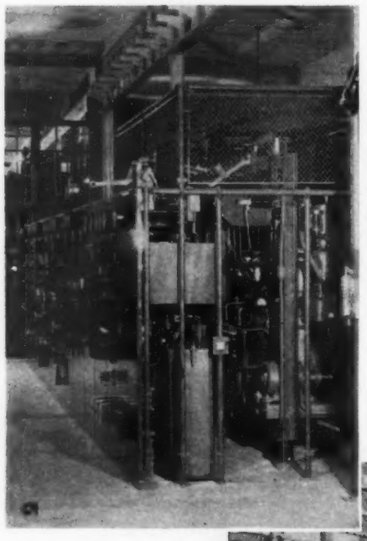
Mercury Rectifier for Plate Supply

By G. T. ROYDEN
Division Engineer
Mackay Radio & Telegraph Company,
San Francisco

Claiming to be the first application of its type in the United States, a tank-type, mercury-arc, grid-controlled rectifier was recently installed by the Mackay Radio & Telegraph Company to supply direct current at high voltage for the plate circuits of four large high-power vacuum tube transmitters which provide direct radio communication between San Francisco and China and Japan. At full-rated power, these radio transmitters of this station near Palo Alto radiate 50 kw. of energy from the beam antennas.

The mercury-arc rectifier is rated for a continuous output of 250 kw. and may be adjusted by means of taps on the main power transformer for voltages of 8, 11, 14, 15 or 16 kv., with intermediate and lower voltage obtainable by grid control. A feature of the control equipment for the rectifier is the provision for automatically interrupting an overload current in about 0.03 second and restoring power by grid control in the rectifier. After three successive interruptions the main oil circuit breaker is opened. Power is taken from the three-phase, 4-kv. system of the Pacific Gas & Electric Company and transformed to six-phase at the desired voltage.

Although approximately 50 per cent higher in first cost, the mercury-arc rectifier proves to be more economical than the conventional tube rectifier on account of its lower maintenance. With the vacuum tube rectifier, tube replacement cost was estimated to be approximately $3,000 annually for the service required of the transmitter. The mercury-arc rectifier eliminates the tube replacement cost and operates at an efficiency and reliability equal to that of the former.



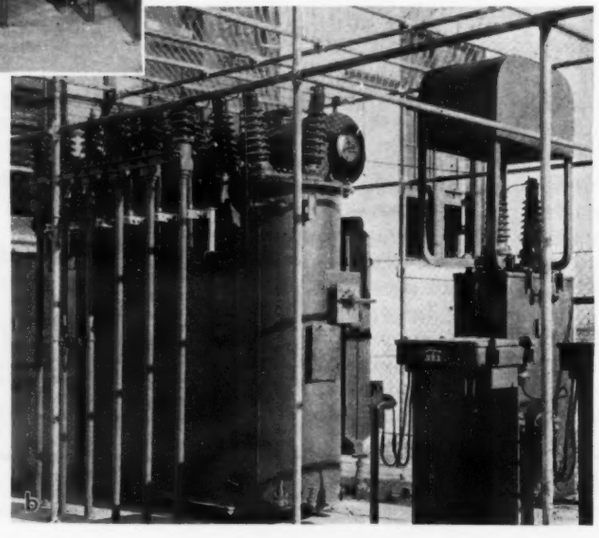


Plate current from mercury rectifier

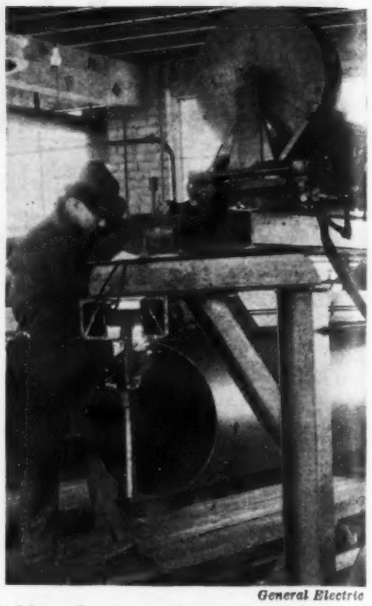
(a)—Interior of the Palo Alto transmitting station of the Mackay Radio & Telegraph Company, showing mercury-arc rectifier installation. (b)—At the left is the main transformer supplying six-phase power for the 250-kw. mercury-arc rectifier. At the rear is the filter reactor for the rectifier and in the foreground are transformers for a 50-kw. thermionic rectifier.

•

Arc Welding Speeds Production

Automatic arc-welding equipment is being used by the Southern Pipe & Casing Company, Azusa, Calif., to fabricate steel pipe ranging from 14 gage to ⅜ in. thickness. Five hundred to 2,000 ft. a day is thus fabricated, depending on the thickness, with welding speeds as high as 30 in. per minute on the thinner material, it is reported. Since using automatic arc welding this manufacturer declares no leaks have been reported in pipe lines so made.

Machines having automatic arc-welding heads and carriages are used with type B electrodes. Each welder has its own constant-potential generator, resistor and reactor. Welding currents run as high as 500 amp. for the heavier pipes and electrodes. Two single-operator welding sets are used for miscellaneous jobs, such as tacking.



General Electric

Welding heads and travel carriages aid fabrication of pipe

•

Power Drill Adapted as Agitator

In preparing plastic compounds in a heated vat at the Oakland, Calif., plant of the Gardner Transformer Company periodic agitation was required to obtain a thorough mixing and an even constituency of the product. To stir the compounds manually was not particularly pleasant for the operator, who had to stand over a hot, odoriferous tank, nor did hand stirring insure proper mixing unless performed frequently and thoroughly.

Endeavoring to devise a mechanical form of agitation, the idea of using a standard power drill was suggested. To one end of a long metal rod a circular disk was affixed. The other end was arranged to fit into a standard trigger-operated power drill chuck. This assembly was suspended above the tank, the electrical connection being made through the usual flexible cord attached to the power drill. Now when stirring is required, the operator merely pulls the drill down into position and pulls the trigger on the drill. The improvised device has proved extremely practical and provides the required agitation at a low cost.

SIGHTLY

Can scarcely be seen from the ground.

NOISELESS

No metal parts to rub and creak in the wind.

LIGHT

No heavy mass to cause vibration fatigue.

STRONG

No fear of ice load and wind. Made of finest bronze wire . . . PMG.

ADAPTABLE

Fits round, oval and twisted service cables. Each grip takes several diameters of cable.

ADJUSTABLE

Any stretch in the span can be taken up instantly by pulling up the cable and pushing back the grip.

FLEXIBLE

Flexible as the cable it supports . . . sways freely with it, not bending the cable sharply nor breaking the braid over a rigid metal part.

EASILY INSTALLED

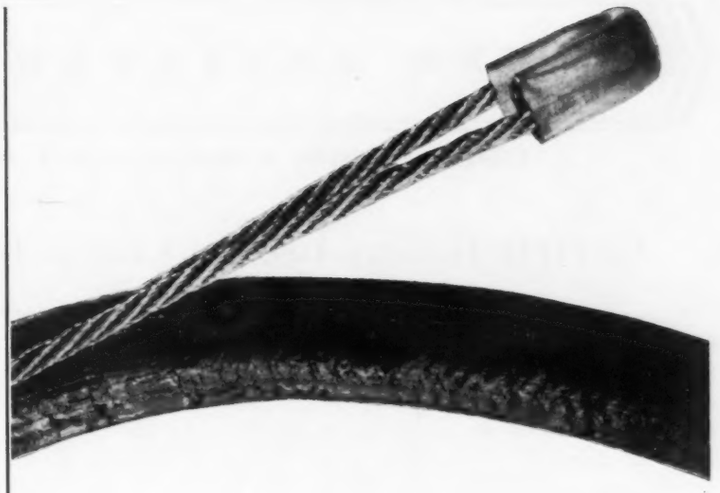
Expands when pushed over the end of cable and is placed anywhere along the span as fast as the cable is run through the hands.

VARIABLE MESH

Grips evenly over the full area covered by the mesh and equally around the cable. No concentration of strain or cutting action at any point.

OPEN AND POROUS

The braid "breathes" through the mesh and ages harmoniously with the rest of the span. No water decays that portion covered by the grip as nothing catches and holds the rain. It drains off as it falls.

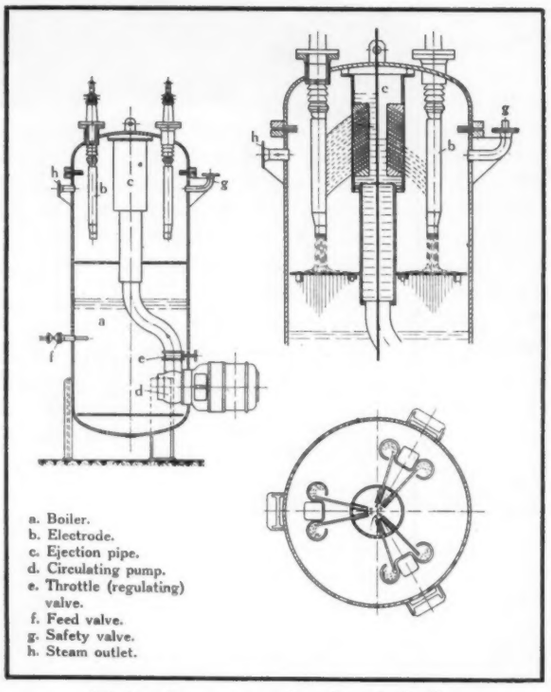


KELLEMS PRODUCTS INC.

100 Lafayette St., New York

Electric Boilers Use Jet Conduction

A new type water-jet, high - voltage electric boiler developed by Brown - Boveri differs from all previous designs in principle and construction. Electric current does not, as in conventional boilers, flow from immersed electrodes through a stationary column of water, but is conducted through a number of water jets which radiate continuously from nozzles to the electrodes.



High-voltage water-jet electric boiler

The three electrodes are arranged concentrically about a vertical ejection pipe provided with three vertical double rows of nozzles to which water is supplied from a circulating pump. Water from the nozzles impinges tangentially on the inner surfaces of the electrodes, spreads and is deflected downward in a helical path. Tubular extensions are provided at the lower ends of the electrodes in order to concentrate the water into a jet which impinges on a perforated plate that is electrically connected to the boiler shell.

Two current paths of constant length are formed per phase between the neutral point of the electrical system, to which the boiler shell and injection tube are connected, and the electrodes. One path is between the ejection tube and the electrodes, the other between the electrodes and the perforated plate. The water, along both paths, is heated by its own resistance. Under operating conditions the water is practically at evaporation temperature, since it flows continuously in a closed circuit. The greater part of the energy supplied, therefore, is used for evaporation.

Output of the boiler is regulated exclusively by varying the quantity of circulating water so that a greater or smaller number of nozzles are in use. Under maximum load water sprays over the entire length of the electrodes and under partial load over part of their length only.

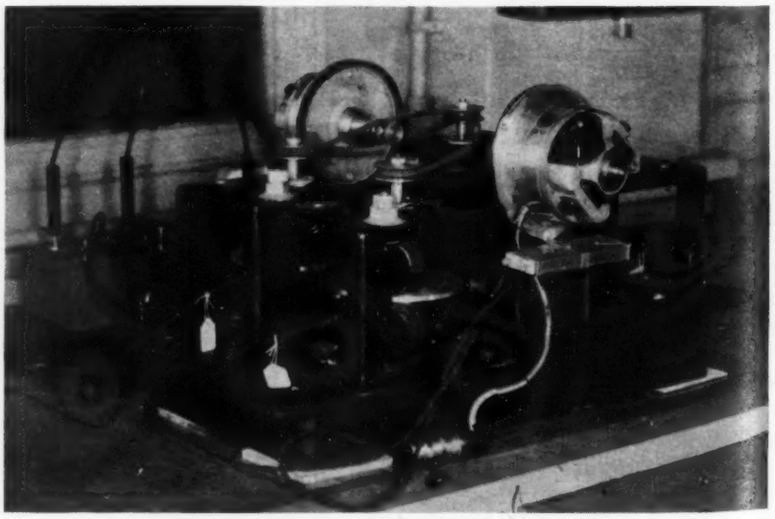
This boiler has no immersed ceramic parts inside of it subject to attack and to be replaced occasionally. The boilers are built for three-phase operation from 2,000 volts upward and for outputs of 300 kw. to 10,000 kw. and above. They are particularly suited for using surplus power from hydro-electric power stations at off-peak periods. They can be used in standby steam power plants to keep the large steam boilers warm and ready for operation.

•

Belts Tested by Electric Brake Unit

By L. K. ACHESON
The Hoover Company, North Carolina, Ohio

Electric brake units have been devised for research development of vacuum cleaner belts to determine their life under variable-speed constant load, various pulley contours, pulley center relations and variable load at constant speed. They facilitate development and test of appropriate belts in advance of the completion of new cleaner models. The belt



Vacuum cleaner belts tested by eddy current brake

Either the driving or driven pulley may be removed by removing a single locknut. Pulley center distance varied by means of adjustable slots in base. Either straight or quarter-turn drives readily obtainable.

A NEW 1936 GOULD KATHANODE BATTERY

Again Gould leads the Parade

INFINITELY sturdier, longer lasting, outstanding in performance and more economical than ever before, Gould 1936 Armored Glassklad Kathanode Cells are the greatest scientific achievement in the development of modern lead acid storage batteries. New designs based on more than 10 years of fundamental research and service tests greatly enhance those exclusive advantages which the Kathanode construction has continuously retained over all types.

★ Six major features, exclusively Gould, deliver sustained capacity to the end of the battery's useful life. Type KMD Armored Glassklad Kathanodes with Durapor Separators will handle full capacity loads after years of service, *with new battery performance.* For Glassklad assembly provides a barricade that locks the active material in the base structures. There is always the full complement of peroxide in the elements until the battery is completely worn out.

Locking in the active material permits the smallest sediment space of any commercial design. The 1¼" high supporting ribs of type KMD cells are more than ample for the toughest possible service.

With this extra space available, the taller Kathanode element contains more useful material than any other lead acid cell. Yet it allows such ample acid space at the top, that cell maintenance is reduced to half or less. This vital operating advantage is exclusive with Gould.

"Durapor" Separators .. solid insulating members .. are made by the combination under heat and pressure, of silica gel and comminuted rubber. The minute particles of silica gel operate as a means of electrolyte transfer. These particles absorb many times their own weight of acid. Therefore the electro-chemical action of the battery with "Durapor" Separators is a revolutionary idea in storage battery practice. "Durapor" Separators have exceptional durability, high strength and resistance to heat and acid.

Despite these extra advantages, 1936 Armored Glassklad Kathanodes with "Durapor" Separators, cost less than previous Kathanodes. Their Armored construction plus reserve power prevent premature failures. They will deliver more than full capacity every day for months . . . for years. And they are unqualifiedly guaranteed for 5 years! Mail coupon today for Free Battery Manual.

6 MAJOR EXCLUSIVE FEATURES OF 1936 ARMORED KATHANODES

★ New "Durapor" Separators of silica gel and comminuted rubber.

★ New positive active material . . . Ananide . . . for greater sustained capacity.

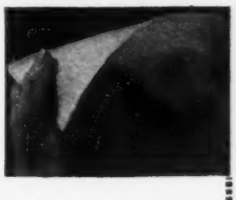
★ New patented "Glassklad" power-lock assembly retains active material in base structures.

★ New positive Ananide units are larger, contain more active material.

★ New design of positive and negative groups for improved performance . . . longer life.

★ New perforated rubber envelope armor mathematically proportioned to secure greatest porosity.

FREE... SCIENTIFIC CURIOSITY, FLEXIBLE SPUN GLASS MAT



Just imagine chemical glass spun to less than a hair's breath, then laminated into flexible mats . . . strong, non-shattering, enduring. With thousands of filaments these Kathanode mats are 90% porous, permitting the free flow of electrolyte. Assembled immediately adjacent to the faces of the positive active material they form the GLASSKLAD barricade which continuously and securely holds the peroxide in the base structure.

Fill out coupon for your free sample of this modern miracle.

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Please send me items checked:

☐ Free sample of "Glassklad" mat. ☐ Free sample of "Durapor" Separator.

☐ Free copy of new Battery Manual on 1936 Gould Kathanodes. Bulletin No. 964.

Name _____

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is in full view during the test for stroboscopic observation of any unusual whipping or rolling behavior under load.

As designed, these brake units are adaptable to subjecting the belts to the same torques, speeds and pulley conditions as will occur in successive cleaner designs. Each loading unit consists primarily of a steel disk rotated between electromagnet poles. The eddy currents create a counter-torque which simulates the load of the rotating agitator in the cleaner nozzle.

To set the unit to absorb a given load the brake unit is connected to a transmission dynamometer and, with the disk at the desired speed, either the excitation of the electromagnets or their radial position relative to the axis of the disk is changed until the desired load is indicated by the dynamometer.

•

Plant Controlled Over 23-Mile Line

Operators can start, stop and control the load on the Canaan hydro-electric plant of the Public Service Company of New Hampshire from the Lyman Falls station, 23 miles distant, by means of a carrier-current installation operating over a single-circuit, three-phase, 33-kv. line connecting the two plants (Fig. 1). No extra conductors are necessary between the stations.

The only Canaan unit is a 1,375-kva., 2,300-volt, waterwheel-driven machine. Due to the system connections 95 per cent of its output at full load passes through Lyman Falls before use. Current and potential transformers, together with a single-phase, indicating wattmeter, calibrated in terms of balanced three-phase power, indicate the output of the Canaan station at Lyman Falls.

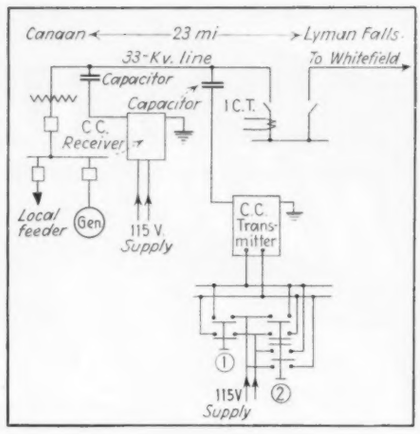

Fig. 1—Schematic diagram of carrier connections between plants.

To start the generator at Canaan, Lyman Falls operates the control switch No. 2 in the direction to pick up load. The switch is held closed for 30 seconds as the generator comes on the line and takes a load of about 200 kw.

At Canaan the carrier-current receiver causes relay No. 1 to close its contacts. This energizes relay No. 65 MXR, which has two contacts; one energizes the reset coil of No. 1X relay, causing the 5-7 contacts of No. 1X to close, completing the circuit through master relay No. 4 and causing it to pick up. The 5 contact of relay No. 4 energizes the governor solenoid No. 65S, causing the governor to open the waterwheel gate. The machine then starts. When it has reached 98 per cent synchronous speed, the No. 1 contact of relay No. 13 X closes, completing the circuit through No. 52X coil, which causes No. 52X to close its contacts, energizing the closing coil of the generator circuit breaker, connecting the generator to the line as an induction motor. The field of the generator is then applied and the machine assumes load in accordance with the governor setting. The circuit for application of the field is not shown.

To shut down the generator, Lyman Falls throws the governor control switch No. 2 to the drop load position, closing the waterwheel gate.

When the gate mechanism reaches the running light position limit switch No. 33B closes, energizing time-delay, stopping relay No. 62. This relay completes its timing period, its 3-4 contacts close, energizing the operating coil of No. 1X relay, causing it to open its contacts 5-7, which are in the circuit of the master relay No. 4. This makes relay No. 4 drop out and shut down the machine.

For control purposes one General Electric type GCS-9A2 carrier-current transmitter, capacitor-coupled to one phase of the 33-kv. line and to ground, is installed at Lyman Falls. This is a half-wave rectifier and will send out either a positive or negative wave at carrier frequency. Two control switches are provided, one a standard double-pole, single-throw switch (No. 1) and the other a double-pole, double-throw, governor-control switch (No. 2). The latter is used to start, stop and control the load on the generator and also for reversing the a.c. connection to the carrier-current transmitter to permit sending of half waves of either polarity.

At Canaan a type SCS-6A1 carrier-current receiver with a double receiver element is used for responding to either half wave. The receiver is coupled as before. Contacts of the relays are designated as Nos. 1 and 5 in Fig. 2, which shows the principal circuits involved in the automatic switching at Canaan.

•

Provides Sunlight Without Sunburn

Used in any standard lamp socket without the necessity for additional transformers or fixtures, a new electric light bulb developed by George S. Sperti of General Foods, Inc., provides ultra-violet light rays with complete freedom from danger of sunburn.

A small corex glass tube is inclosed in a larger bulb of the same material. The inner tube operates as a mercury-vapor lamp which radiates very little visible light. The corex glass envelope filters out all injurious frequencies from the light. Within the outer bulb a tungsten-filament provides visible rays which in addition to permitting use of the lamp as a reading or working light provides a balance between ultra-violet and visible light, similar to that obtaned in daylight, but with the injurious rays filtered out. Dual construction of the lamp is said to eliminate necessity for special transformers, since the filament acts as a ballast for the arc, it is stated.

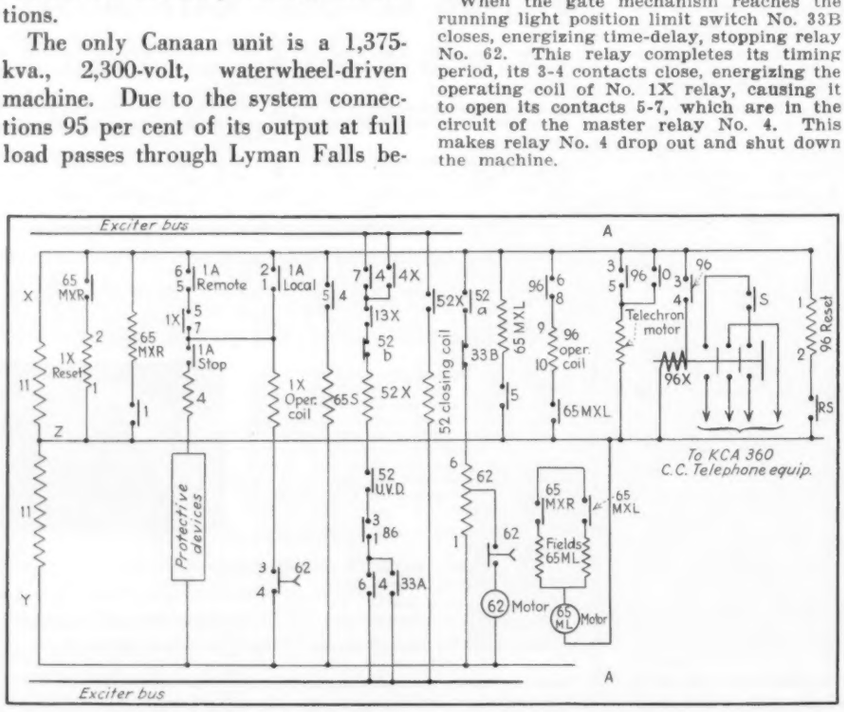

Fig. 2—Principal carrier-current relays for remote control operation at Canaan

Stream Gage Data by Automatic Radio

[*Continued from page 31*]

ment is concerned and dependent only upon the height of the gage well.

The signal transmitted by the keying device and transmitter is always the positive reading of the true gage height at that station.

The reading consists of a series of short dashes of pure C.W. radiations. For example, if the gage height at the time of transmission is 4.62 ft., the signal heard at the receiver would be, first, a series of four dashes (which the listener counts as he hears it), then a pause, then six dashes, another pause, and then two dashes, and then a long pause. In addition to the gage height, the keying device then automatically sends out a series of dots and dashes identifying the station. These call letters are repeated between each gage height signal, the total elapsed time for a complete round of signals consisting of three figures of the gage height and the call letters being approximately one minute and three-quarters. Time switching arrangement in the keying device can be adjusted to various desired times of transmission. The transmitter can be energized at 2-, 4-, 6-, or 12-hour intervals and the length of time of each transmission can be varied to run from five to 45 minutes, the signals being repeated continuously during the period when the transmitter is energized.

Any short wave receiver capable of covering the radio spectrum from 110 to 130 meters and likewise capable of receiving unmodulated c.w. signals can be used to receive the radio stream-gage signals.

Performance satisfactory

Ten installations of the automatic radio stream-gaging station have been installed at critical points on California rivers. Some of these have been operating satisfactorily for more than two years and have proved their reliability and accuracy in that time. The maintenance cost of these stations is relatively small. Under normal service a set of dry cells, costing $3, will last approximately two months on a two-hour schedule and correspondingly longer on schedules of greater intervals. The set of "B" batteries, costing $10, will last from four to six months.

The important value of these radio indicators lies not only in their value to save administration costs in watermaster work, but also in giving more accurate and more frequent information to headquarters than can be obtained in any other way. Their value probably is most appreciated in flood control work by giving timely flood warnings when ordinary means of communication are temporarily disrupted.

Uniformly good commutation is the mark toward which intelligent brush application is aimed.

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GRADED COMMUTATING CHARACTERISTICS
UNIFORM PHYSICAL PROPERTIES · UNIFORM PERFORMANCE

The outstanding performance of "SA" Series Brushes on heavy duty D.C. service is the result of

NEW COMBINATIONS OF MATERIALS · NEW METHODS OF MANUFACTURE
NEW STANDARDS OF CONTROL

The grades of the "SA" Series cover operating conditions on all types of heavy duty D. C. machines in both industrial and power plant service.

Use "SA" Series Brushes on your heavy duty D.C. equipment.

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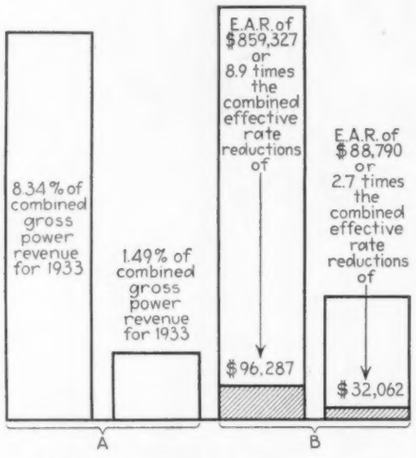
BUILDING UP THE LOAD

APPLIANCES, LIGHTING AND POWER • DOMESTIC • COMMERCIAL • INDUSTRIAL

Power Salesmen Pay Their Way

By R. D. HAYES
Middle West Utilities Company, Chicago, Ill.

Many electric utilities of average size and smaller have no specialized power salesmen; such luxuries, it is felt, being only for those that can afford them. But power salesmen are not luxuries, as is proved by the accompanying chart erected on data from companies in the Middle West group. The chart shows that companies which employed specialized power salesmen in 1934 reported estimated annual revenue secured amounting to 8.34 per cent of their combined gross power revenue for 1933. Those having no specialized power salesmen reported estimated annual power revenue secured amounting to 1.49 per cent of their combined gross power revenue for 1933. This represents a ratio of 5.6 to 1. The chart shows also that companies having specialized power salesmen reported an estimated annual revenue secured equal to 8.9 times the combined power rate reductions in 1934. Those companies having no specialized power salesmen reported an estimated annual revenue of only 2.7 times the combined rate reductions made for power.


8.34% of combined gross power revenue for 1933
1.49% of combined gross power revenue for 1933
E.A.R. of $859,327 or 8.9 times the combined effective rate reductions of
$96,287
E.A.R. of $88,790 or 2.7 times the combined effective rate reductions of
$32,062
A
B

Effect of specialized power sales activities

The two columns at the left (A) show how the companies with specialized power salesmen secured estimated annual power revenue in 1934 equal to 8⅓ per cent of their gross power revenue in 1933, while those without got only 1.49 per cent. The other columns (B) prove the effectiveness of power salesmen in overcoming industrial rate reductions. The estimated annual power revenue secured in 1934 by those companies having specialized power salesmen was $859,327, or 8.9 times the effective rate reductions. But the companies without such salesmen secured estimated annual power revenue in 1934 of $88,790—only 2.7 times the effective rate reductions —$32,062.

It may be argued that the potential power business in those companies which do not employ specialized men was not as favorable as in the other group. However, analysis of conditions shows that the potential power business available in isolated plants in the two groups does not differ widely in per cent of present power revenue.

There are fifteen companies in the group which do not have specialized men and thirteen companies in the group which do have them. Competitive fuel conditions average very much the same for both groups. If there was any difference the conditions in this respect were most favorable to the group which did not have specialized power men.

•

3-Year Plan to Raise Home Load

The Hydro-Electric Power Commission has a surplus supply energy awaiting a permanent market. Domestic consumers are looked upon as an attractive sales outlet and aggressive merchandising is planned to sell about 100,000 kw. in this market in three years. Some interesting data on the domestic loads now existing on the system were presented recently by G. T. Mickler before the Association of Municipal Utilities. The total average consumption is now about 1,600 kw.-hr. per year and the growth of the business is shown in Table I.

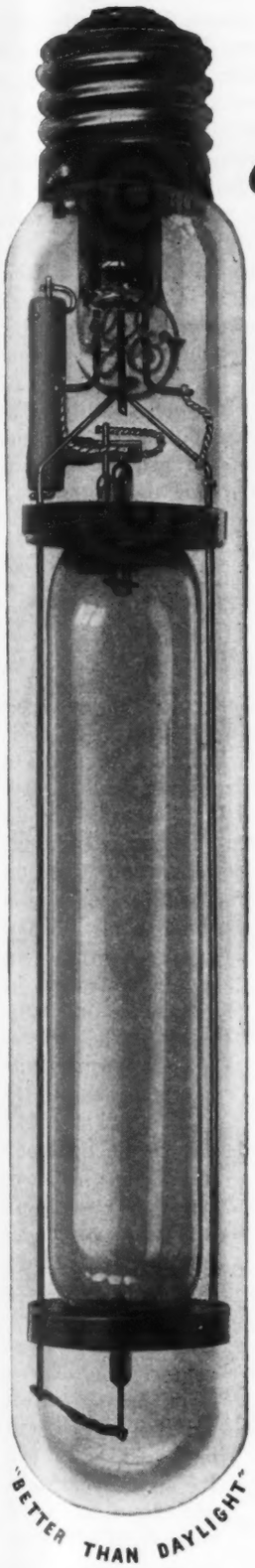
It is interesting to note, however, that about 71 per cent of the cus-

Table II—Appliance Sales in Ontario Since 1924

	Number of Appliances in Use at End of Year		Annual: Number Added per Year	Saturation at End of 1934 per Cent
	1924	1933		
Number of customers..	344,250	464,319	14,452	.....
Ranges.....	47,505	123,352	8,427	26.6
Hot plates...	18,883	61,866	4,776	13.3
Washers.....	55,342	171,327	12,887	36.9
Cleaners....	64,205	123,797	6,621	26.6
Water heaters	16,665	54,059	4,155	....
Grates.....	15,075	21,819	749	4.7
Air heaters..	103,000	141,986	4,332	30.6
Ironers.....	1,590	5,912	480	1.3
Irons.....	307,800	434,413	14,068	93.6
Refrigerators	657	45,382	4,958	9.8
Toasters....	152,200	234,603	9,156	50.5
Grills.....	46,800	43,735	314	9.4
Oil burners..	.....	13,208	.....	2.8
Air conditioners.....	.....	531	.....	0.1
Radios.....	.....	271,574	.....	58.5
Total estimated insialled capacity (kw.).....	806,901	1,653,993	94,121	....
Ave. per customer (watts)	2,350	3,560	1,210	....

Table I—Growth of Domestic Load in Ontario

Year	Number of Consumers	Total Domestic Consumption Thousands of Kw.-Hr.				Average Monthly Domestic Consumption Kw.-Hr.			
		Cities	Towns	Villages	Total	Cities	Towns	Villages	Total
1914.....	64,866	12,646	1,415	291	14,352	21.8	17.4	13.1	21.0
1917.....	131,313	36,693	3,825	1,413	41,931	30.5	21.4	14.0	28.6
1920.....	193,892	84,328	10,053	3,830	98,211	48.4	36.0	21.2	44.6
1923.....	286,852	206,266	25,411	11,429	243,106	83.5	60.1	33.7	75.7
1926.....	349,882	324,290	50,487	29,945	404,722	108.0	89.6	54.4	98.4
1929.....	424,419	497,102	68,283	46,755	612,140	137.2	97.8	67.2	122.5
1930.....	433,260	541,877	72,234	55,917	671,028	144.4	105.0	80.1	130.1
1931.....	447,466	567,940	78,359	58,485	704,784	148.3	108.1	78.4	133.0
1932.....	452,615	593,619	81,054	66,227	740,900	152.8	107.5	83.7	136.4
1933.....	460,878	595,222	82,322	64,651	742,195	150.0	107.3	81.2	134.2

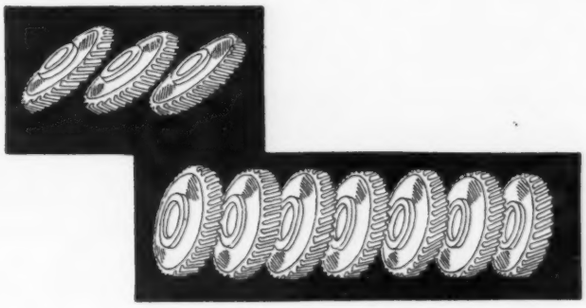


Order your auxiliary devices which were designed especially for this lamp from the General Electric Vapor Lamp Company.

Faster,

MORE ECONOMICAL PRODUCTION

with this detail-revealing light



Speed up production by improving your lighting. Make it easier for workmen to see scribe lines on dies, to read steel scales, to catch misfit mountings, poor soldering, and other sources of lost time and accuracy. The General Electric High Intensity Mercury Vapor Lamp provides the quality of light that penetrates into all corners, that makes shadows luminous, and removes harsh, irritating glare.

Details under this light stand out so boldly that they appear to be magnified. The slightest variation in color shading, too, is immediately apparent.

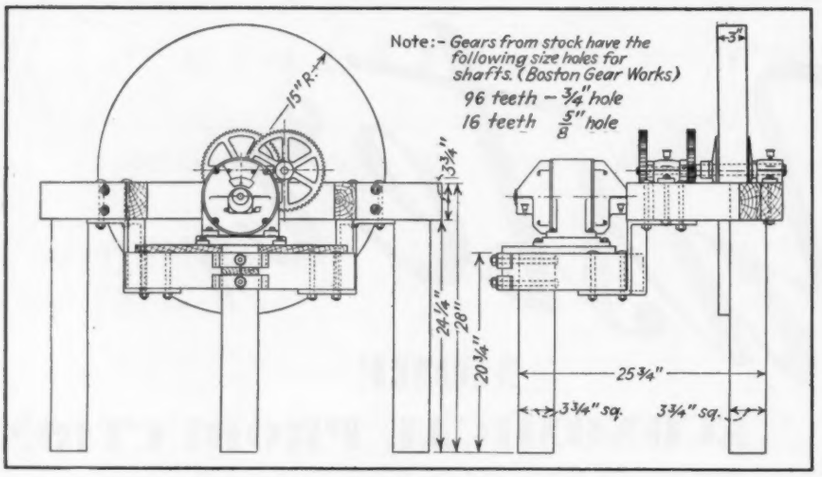
Workmen feel a minimum fatigue from eye-strain under the High Intensity Mercury Vapor Light. There is none of that costly end-of-shift let-down in efficiency due to eye-strain. This fact means more accurate work and fewer rejects . . . and decreased rejects mean money saved for the owner.

Write for the new booklet describing this light in detail. Address the General Electric Vapor Lamp Company, 805 Adams Street, Hoboken, New Jersey.

GENERAL ELECTRIC VAPOR LAMP COMPANY

659 Copr. 1934, General Electric Vapor Lamp Co.

HIGH INTENSITY *Mercury Vapor Lamp*



Plans and elevation of gear-driven grindstone

tomers are below the average use. The distribution is about as follows:

Customers Involved, Per Cent	Annual Usage, Kw.-Hr.
30	<600
30	600 = 1,200
11	1,200 = 1,600
10	1,600 = 2,400
14	2,400 = 5,400
5	>5,400

Thus, despite low rates and non-competing services in many localities, the "loss" or low-use customer is in the majority and offers the greatest problem. The Hydro estimate is that any properly equipped home should use between 500 and 1,000 kw.-hr. a month with an average of 800. With the present provincial average of 133 per month there is a market six times that already sold.

An interesting compilation of appliances sold since 1924 is given in Table II. The larger appliances have increased at a greater relative rate than the smaller and all sales are slow when measured against marketing possibilities.

•

Motorizing the Grindstone

Gear-driven grindstones powered by 3-hp. motors have been found most efficient for farm service as the result of a study by H. N. Colby and W. T. Ackerman at the New Hampshire Agricultural Experiment Station, Durham, N. H. A hand-driven grindstone requires two operators on such heavy work as grinding a mowing machine knife, one to crank the stone and the other to guide the work. Using a value for manual labor of 25 cents per hour, it costs about 12.5 cents to sharpen such a knife. The same work can be done more efficiently for 3.7 cents with a $\frac{1}{3}$-hp. motor operating on a rate as high as 7 cents per kilowatt-hour.

The cost of the complete unit, excluding the labor of assembly, was $37.60, as follows: Motor, $\frac{1}{3}$ hp., single-phase, 110-volt, 60-cycle design, speed 1,725 r.p.m., $12; grindstone, 30 in. diameter and 3 in. thick, $3; shaft and collars, $2; bearings, gears, bolts, etc., $18.50; lumber for frame, $2.10.

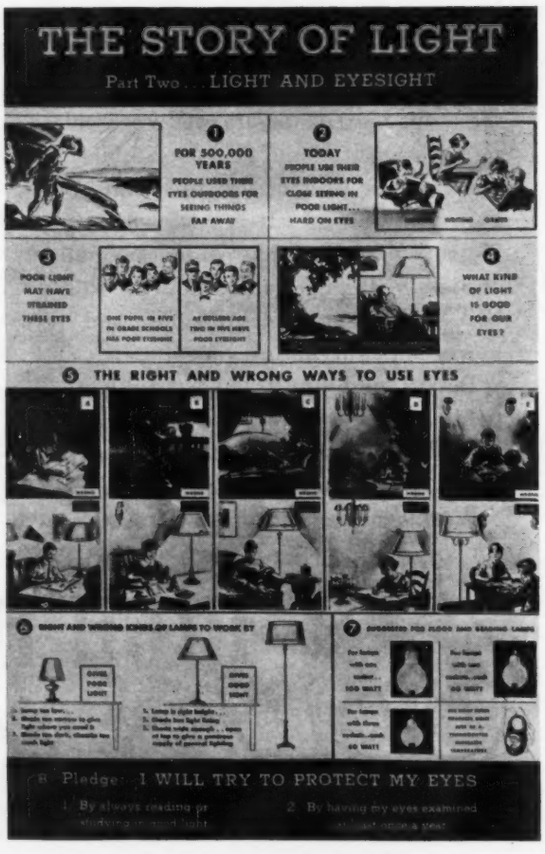
The most popular size of stone for general farm use ranges between 22 and 30 in. in diameter and from $2\frac{1}{2}$ to 3 in. in thickness. A speed of 48 to 60 turns per minute is generally satisfactory. Above 70 revolutions wheels 22 in. or more in diameter tend to throw off water needed to keep the surface from gumming and to increase its cutting efficiency. High speed also makes it difficult to maintain the proper cutting angle between the work and the face of the stone.

An indirect motor drive for a 30-in. diameter stone $2\frac{1}{2}$ in. thick belted to a power bandsaw shaft and running at 68 r.p.m. worked out well. The motor was rated at $1\frac{1}{2}$ hp. and consumed 1.67 kw. when driving both outfits. The estimated cost of fitting up a grindstone drive on the group basis was about $20, excluding the motor.

•

Light Study Course for School Use

In response to call from educators and utilities a work project for use in public schools has been prepared at Nela Park. It comprises eight lessons on the Story of Light and eight on the Story of Seeing. The project was undertaken in collaboration with the *Instructor*, the leading educational publication, reaching some 160,000 grade school teachers, and was checked by educators in many cities. The lessons are supported with two wall charts. The child ultimately checks the light provided in his own home to safeguard his own eyes in his home study. The program is the first step in a broad educational plan for the conservation of eyesight among school children which will be developed this fall. Power companies will be notified when local school authorities take on this course, so that their home-lighting people may co-operate.


THE STORY OF LIGHT
Part Two . . . LIGHT AND EYESIGHT
1
FOR 500,000 YEARS
PEOPLE USED THEIR EYES OUTDOORS FOR SEEING THINGS FAR AWAY
2
TODAY
PEOPLE USE THEIR EYES INDOORS FOR CLOSE SEEING IN POOR LIGHT... HARD ON EYES
3
POOR LIGHT MAY HAVE STRAINED THESE EYES
4
WHAT KIND OF LIGHT IS GOOD FOR OUR EYES?
5 THE RIGHT AND WRONG WAYS TO USE EYES
6
7
8 Pledge: I WILL TRY TO PROTECT MY EYES

One of two charts on the Story of Seeing prepared for use in the public schools

THE CRADLE OF CIVILIZATION, the Nile Valley, gave us our first man-made Bronze around 3500 years ago; about 400 B.C., the Etruscans first used it as armor for themselves and their chariots. . . . This basic discovery still serves us today—as does also the basic discovery by A. L. Marsh in 1906 which first gave to mankind the advantages of Electric Heat.

This was Marsh's discovery of the nickel-chromium resistor, Chromel, which first put to practical use the long known fact that heat could be generated by passing electricity thru wire. This discovery of Chromel developed a domestic heating load that now yields the power companies $11,000,000 every month. This load is growing daily thru increased acceptance of the ironer, water heater and range. Thus, Chromel is a friend of yours, in which you may safely trust. . . . For technical data, ask Hoskins Mfg. Co., Detroit, for Catalog-JW.

H O S K I N S

CHROMEL

THE *wire* THAT MADE ELECTRIC HEAT POSSIBLE

MEN OF THE INDUSTRY

B. W. Kerr and F. W. Magin New N.E.M.A. Vice-Presidents

Benjamin W. Kerr, who was recently elected first vice-president of the National Electrical Manufacturers' Association (ELECTRICAL WORLD, October 26, page 58), entered the electrical industry with the Westinghouse Electric & Manu-

B. W. Kerr

facturing Company, where he took an apprenticeship course in 1908 and 1909. The following year he became assistant electrical engineer for the Pittsburgh Railways Company and subsequently was named assistant manager of the Railway & Industrial Engineering Company, a position he occupied until 1914. From 1914 to 1918 Mr. Kerr served as vice-president and general manager of that company and in the latter year was elected to his present position of presi-

F. W. Magin

dent and general manager. He is also president of the Electrical Development & Machine Company of Greensburg, Pa., and holds the same position with the Kirk Interlock Company, also of Greensburg. At the present time Mr. Kerr is a member of the board of governors of N.E.M.A., a member of the executive committee and chairman of the N.E.M.A.-F.H.A. advisory committee.

Francis W. Magin, who was elected third vice-president of N.E.M.A., rose to the presidency of the Square D Company through diligent work in the electrical industry. Starting out with laborious work in the shop of the Allis-Chalmers Manufacturing Company, he was transferred to the company's New York branch office, working in the cement machinery division and the general sales department. Altogether he was with Allis-Chalmers for thirteen years. In 1913 he became associated with the Industrial Controller Company, which had been organized about a year previous to that time. In 1929, when this company was merged with the Square D Company, Mr. Magin was made vice-president and general manager of the industrial controller division. About two years ago he assumed the duties of president.

•

► GEORGE J. LONG, formerly manager of the Webster City (Iowa) municipal light, water and gas plants, has been appointed to the staff of the Rural Electrification Administration, Washington, D. C.

► LAMAR ALDRIDGE, treasurer of the Alabama Power Company, was recently elected to a vice-presidency. He will continue as treasurer.

► A. F. DARLAND, formerly superintendent of electrical construction and design in the department of public utilities, Tacoma, Wash., is now field engineer with the Department of the Interior, Reclamation Service, on the Grand Coulee project.

► R. L. BOWEN, for the past year vice-president of Community Public Service Company, has been elected to the presidency of the corporation. Mr. Bowen has been connected with Community Public Service Company and its predecessor organizations since 1921.

► LAUREN V. SEARES has returned to Arizona Power Company, Prescott, as general manager of the concern, a position he held from 1927 until January, 1934, when the company went into receivership, followed by trusteeship under the national bankruptcy act. Announcement of his return was concurrent with ending of the trusteeship in district federal court. MALCOLM M. BRIDGWATER, general superintendent prior to and during the trusteeship, will be continued in that position.

E. R. Acker Heads Empire State Association

Ernest R. Acker, who was elected president of the Empire State Gas and Electric Association at the recent meeting at Rye, N. Y. (ELECTRICAL WORLD, October 12, page 46), is president and general manager of the Central Hudson Gas &

E. R. Acker

Electric Corporation. Mr. Acker has been associated with the Central Hudson system since 1919. He has been active on committee work in the American Gas Association as well as in the Empire State Gas and Electric Association, which he has just been selected to head.

•

G. L. Knight Named President United Engineering Trustees

G. L. Knight

George L. Knight, vice-president in charge of mechanical operations of the Brooklyn Edison Company, was elected president of United Engineering Trustees, Inc., at a meeting of that body on October 24. Mr. Knight has been a vice-president of the Brooklyn Edison Company since 1932. He is a fellow of the

MAINTAIN HIGH ENGINEERING STANDARDS WITH 8-STRAND

A·C·S·R·

● Lower first cost of rural lines *can* be achieved without compromise with engineering standards that have stood the test of years of experience.

For this new 8-strand A. C. S. R. (7 Aluminum over 1 steel) is 25% stronger. With it you can lengthen your spans materially, with consequent savings in line cost, and without increasing stresses beyond reasonable and safe values.

To this assurance of dependability, add the reliability of A.C.S.R. that comes as a result of the protection that the Aluminum strands give to the steel, when the inevitable flash-overs occur. Remember that the Aluminum strands themselves burn less deeply, because arcs striking Aluminum are unstable and cause only surface burns.

Make a note, too, that fittings for this new conductor are interchangeable with those for the equivalent 7-strand cables.

Ask now, for complete data on this new stranding. ALUMINUM COMPANY OF AMERICA, 1838 Gulf Building, Pittsburgh, Pa.

ALCOA ALUMINUM

American Institute of Electrical Engineers and a member of the American Society of Mechanical Engineers. He was a member of the board of directors of the Engineering Foundation from 1927 to 1932 and is a past-president of the Brooklyn Engineers' Club. Mr. Knight has been vice-president and chairman of the finance committee of United Engineering Trustees for the past two years.

Other officers elected were: H. G. Moulton, first vice-president; Otis E. Hovey, second vice-president; John Arms, secretary, and Albert Roberts, assistant treasurer.

•

W. N. Clark Honored by Rocky Mountain Group

W. N. Clark, president of Southern Colorado Power Company, received the annual award of merit presented by the Rocky Mountain Electrical Association for the most outstanding result or material contribution toward the advancement

W. N. Clark

of the electrical industry by an individual or company in the Rocky Mountain region during the past year. The award, a diamond-studded medal charm engraved with Mr. Clark's name, was conferred by G. W. Buck, president of the association, at a special ceremony attended by delegates and visitors to the recent annual convention at Estes Park, Colo.

The citation read in part: "In this instance a happy combination of individual and company achievement enters into the winning of the award . . . During the past year, and for a long time prior thereto, his administration has been a potent factor in maintaining the company on a reasonably profitable basis, while providing service, often under adverse economic conditions, at a consistently low price. During this time he has captured and held the respect, esteem and confidence of his customers, the public and his employees and associates . . ."

•

▶ ALFRED M. SMITH has been appointed a member of the Nevada Public Service Commission.

W. D. Hamerstadt Elected to New Executive Position

W. D. Hamerstadt was recently elected president of the Rockwood Manufacturing Company, Indianapolis. Mr. Hamerstadt was graduated from Purdue Uni-

W. D. Hamerstadt

versity in 1905, entered the Rockwood employ in 1907 and became successively chief engineer, superintendent and general manager. He has been active in various founders' and metal trades groups and is at present in his third term as president of the Associated Employers of Indianapolis.

•

E. F. Pearson Chief Engineer of Northwestern Electric

Realignment of staff and line organizations in Northwestern Electric Company, Pacific Power & Light Company, Portland Gas & Coke, allied companies of Portland, Ore., has resulted in separation of engineering and accounting functions.

In the engineering departments E. F. Pearson has been made chief engineer of the Northwestern Electric Company. Mr. Pearson has been connected with Northwestern since 1912, serving suc-

E. F. Pearson

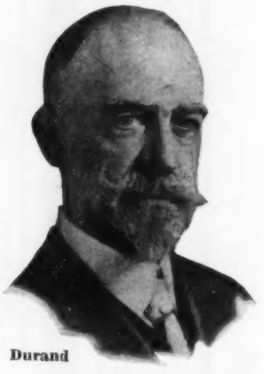
cessively as field engineer on transmission and distribution work, assistant superintendent of transmission and distribution, and electrical engineer, the position he held until his recent promotion. H. H. Schoolfield is chief engineer of Pacific Power & Light Company.

The accounting department of the Northwestern Electric Company is headed by Ralph Lawlor, while J. G. Hawkins is chief accountant for Pacific Power & Light Company.

•

W. F. Durand Receives John Fritz Medal

William F. Durand was awarded at the annual meeting of the John Fritz Medal Board of Award the gold medal for 1936 for notable achievement "as authority in hydrodynamic and aerodynamic science, and in its practical application; outstanding leader in research and in engineering education." Doctor Durand is professor emeritus of mechanical engineering at Stanford University, California. In the course of his academic career he has also been connected with the teaching staff of the Agricultural and Mechanical College of Michigan and Cornell University. Dr. Durand invented precision measuring instruments. Early



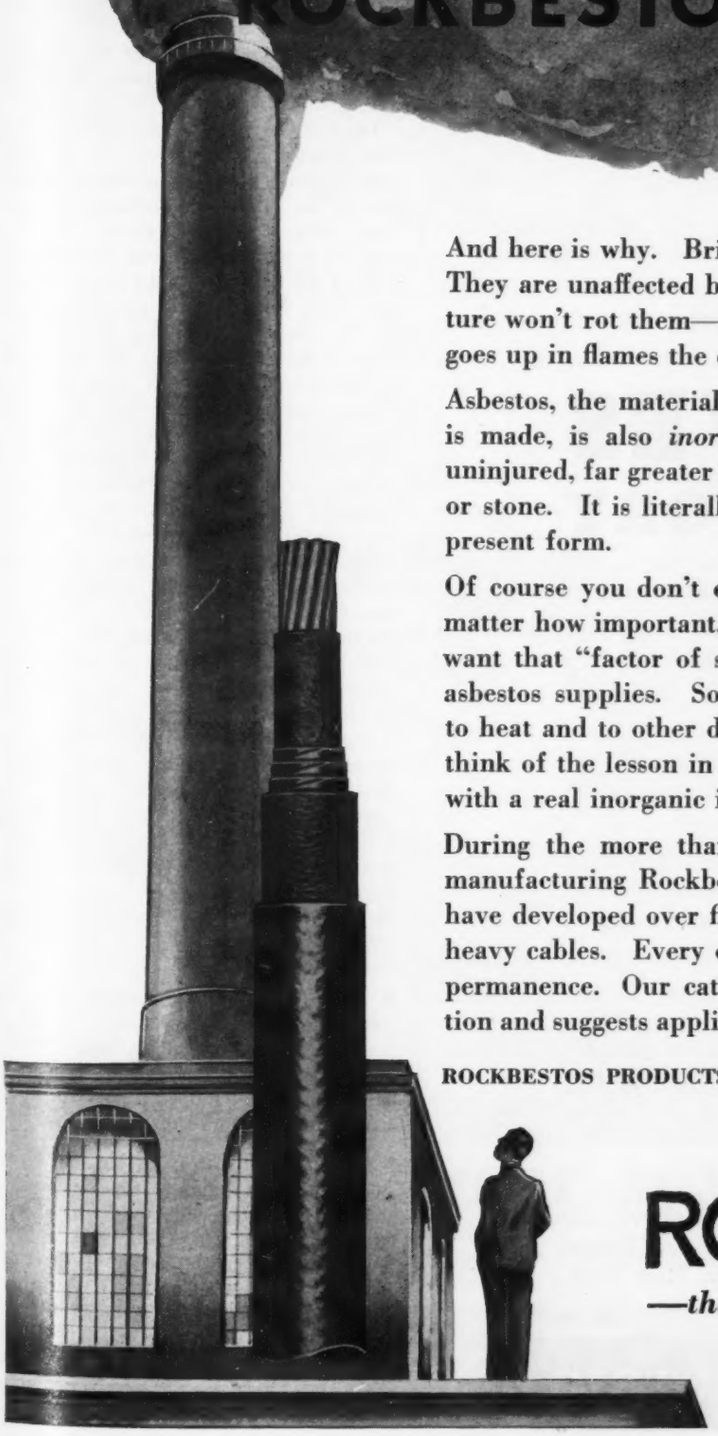
W. F. Durand

in life he became interested and active in scientific and engineering research. He is a member of a number of leading scientific and engineering bodies in this country, England and France and is a past-president of the American Society of Mechanical Engineers. He has frequently served as consultant to the United States government on projects of the Bureau of Reclamation, particularly the Boulder Canyon project, the Grand Coulee project and the All-American canal near the Mexican border.

•

▶ MANLEY E. LORD, secretary of the manufacturing committee of the General Electric Company since 1930, has been promoted to a new position as co-ordinator of all refrigeration manufacturing units of the company. Mr. Lord will be succeeded as secretary of the manufacturing committee by Armand T. Chandonnet, for the past several years on Vice-President Burrows' staff doing special assignments. Mr. Lord has been identified with General Electric since 1908. Mr. Chandonnet entered the employ of the company in 1924.

YOUR CHIMNEY *Demonstrates the* ROCKBESTOS STORY



And here is why. Brick, stone and cement *are inorganic.* They are unaffected by any ordinary heat or cold. Moisture won't rot them—and even if the rest of the building goes up in flames the chimney will still stand unhurt.

Asbestos, the material from which Rockbestos insulation is made, is also *inorganic*—and indeed will withstand, uninjured, far greater temperature changes than any brick or stone. It is literally millions of years old today in its present form.

Of course you don't expect your wiring installations, no matter how important, to last a million years, but you *do* want that "factor of safety" which the changelessness of asbestos supplies. So, whenever permanence, resistance to heat and to other deteriorating influences are essential think of the lesson in your chimney, and insist on a wire with a real inorganic insulation—Rockbestos.

During the more than fifteen years that we have been manufacturing Rockbestos insulated wires and cables we have developed over fifty types ranging from fine wire to heavy cables. Every one has these important qualities of permanence. Our catalog fully describes their construction and suggests applications. May we send you one?

ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN, CONN.

ROCKBESTOS

—the wire with permanent insulation

THE G-E TIME SWITCH
FOR CONTROLLING
WATER-HEATER LOADS

G-E Type T-11 time switch

SAVES
ON INVENTORY

THE ease with which the G-E T-11 time switch "fits" into practically any installation makes it most convenient. You carry one item in stock, and thus keep down your investment in time-switch inventory.

You also save on first cost, because this switch is reasonably priced; and you save on installation and you save on maintenance.

Let us explain how the features of the T-11 switch make these economies possible. Details and prices are given in Bulletin GEA-1669, "Time Switches for Controlled Water Heating."

●

General Electric has also developed carrier-current equipment for the control of off-peak loads. The method—time-switch or carrier-current — best adapted for a particular set of conditions is thoroughly covered by two new G-E publications: GEA-2058, "How to Control Water-heater Loads" and GES-1106, "Revenue in Off-peak Loads Properly Controlled."

●

For copies of publications mentioned above, address the nearest G-E Sales office, or General Electric, Dept. 6C-201, Schenectady, New York.

440-56

GENERAL ELECTRIC

OBITUARY

Judge William I. Grubb

Judge William I. Grubb of the United States Court for the Northern District of Alabama for more than twenty-five years, died suddenly, October 27, at his home in Birmingham. He was 73 years old. Judge Grubb attracted national attention during the past year. In several important rulings in cases involving the New Deal he adjudged the NRA to be unconstitutional, as he did the T.V.A., and he made several adverse decisions against the P.W.A.

On February 22 of this year he ruled that it was unconstitutional for the federal government to manufacture electric energy for sale in competition with private utilities. The decision was extremely important, as it not only affected the T.V.A., but the Grand Coulee, Bonneville, Fort Peck and Caspar-Alcova dam projects in the West and the development of the St. Lawrence. He ruled that a contract under which the Alabama Power Company transferred its northwestern Alabama transmission lines to T.V.A. was illegal. He also made permanent a temporary restraining order enjoining fourteen north Alabama towns from accepting or expending P.W.A. funds for the construction of competing systems. He ruled that as the T.V.A. and P.W.A. were both branches of the United States Government, the use of P.W.A. funds for competing systems, in effect, would be assisting the T.V.A. in an illegal act.

Long before New Deal decisions brought him fame, Judge Grubb gained national attention. As a result of decisions in Alabama, rarely overturned by higher courts, he came to serve frequently on the United States Circuit Court of Appeals. He was appointed to the federal bench by President Taft in 1909.

●

▶ JAMES CLARK, JR., president of the James Clark, Jr., Electric Company, Louisville, Ky., died at his home in that city October 9. He started his career in the electrical industry in 1890. Mr. Clark was a member of the A.I.E.E.

▶ CHARLES D. JONES, chairman of the board of the Cincinnati Gas & Electric Company and president of the Little Miami Railroad, died October 25 in New York, after a long illness. He was 64 years old. Between 1915 and 1928 he was president of the Cincinnati Gas & Electric Company and since 1928 had been chairman of the board. After practicing law in Cincinnati, his native city, for thirteen years, he became secretary

PARKWAY CABLES

OUTSIDE of the United States, buried cables are as common as conduit lines are here. Notwithstanding this, the trend is definitely toward the former. **The American Steel & Wire Company** has blazed the trail with its installation of 44KV "parkway" cable and the hundreds of installations of non-leaded submarine cable. For the "perfect" non metallic sheathed buried cable ask for a sample of our **Triple "L"**. If unusual mechanical protection is required, specify **"Armorlokt"** or standard metallic finishes.

AMERICAN STEEL & WIRE COMPANY

208 S. LA SALLE STREET, CHICAGO • • EMPIRE STATE BUILDING, NEW YORK

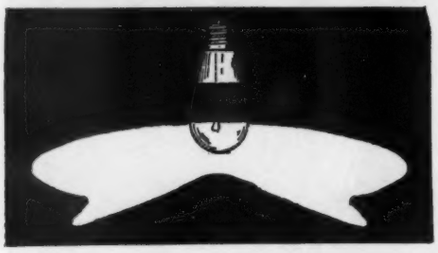
Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco

Offices in All Principal Cities

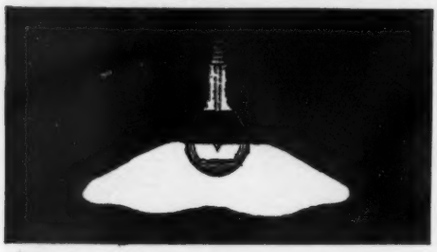
Export Distributors: United States Steel Products Company, New York

United States Steel Corporation Subsidiary

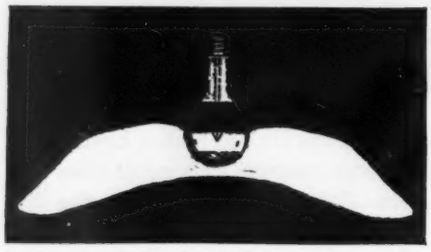
for better STREET LIGHTING . . .



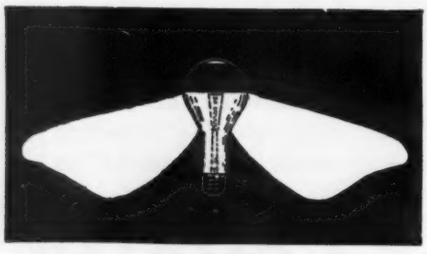
Silvray "Multiplex" B.U.C. Processing. Symmetric Distribution. Base Up-Burning Position. For use only on straight side bulbs.



Silvray "Multiplex" B.U.F. Processing. Narrow Range Symmetric Distribution. Base Up-Burning Position.



Silvray "Multiplex" B.U.S. Processing. Wide Range Symmetric Distribution. Base Up-Burning Position.



Silvray "Multiplex" B.D.C. Processing. Any Range Symmetric Distribution. Base Down-Burning Position.

SILVRAY "MULTIPLEX" PROCESSING

Controls and directs light rays toward the surfaces to be illuminated, without the use of separate reflecting devices. It is adaptable to all standard types of street lighting equipment . . . and is widely used and endorsed.

A Proven Plan . . . Attractive to Municipalities

The Utility is enabled to offer Civic Authorities a proven plan for an increase of from 30% to 50% in *effective* illumination . . . at an annual cost about equal to that of present lamp renewals. In these days of municipal economy, such a plan sells readily.

For a More Satisfied Public

Good street lighting promotes civic pride . . . encourages business . . . decreases accidents . . . and reduces crime. Silvray "Multiplex" Processing will get better results from existing lights; make possible additional lights.

Will Build Up Your Street Lighting Load

The economies effected per light, encourage the placing of additional lights in inadequately illuminated spots throughout the city. Thus Silvray "Multiplex" Processing builds up your street lighting load.

Write for full information or have one of our Engineers call with reference to a Survey or Recommendations.

AMERICAN STREET ILLUMINATING COMPANY

"Backed by 57 Years' Street Lighting Experience"

261 NORTH BROAD STREET . . PHILADELPHIA, PA.

and treasurer of the Little Miami Railroad Company. In 1927 he succeeded his father as president.

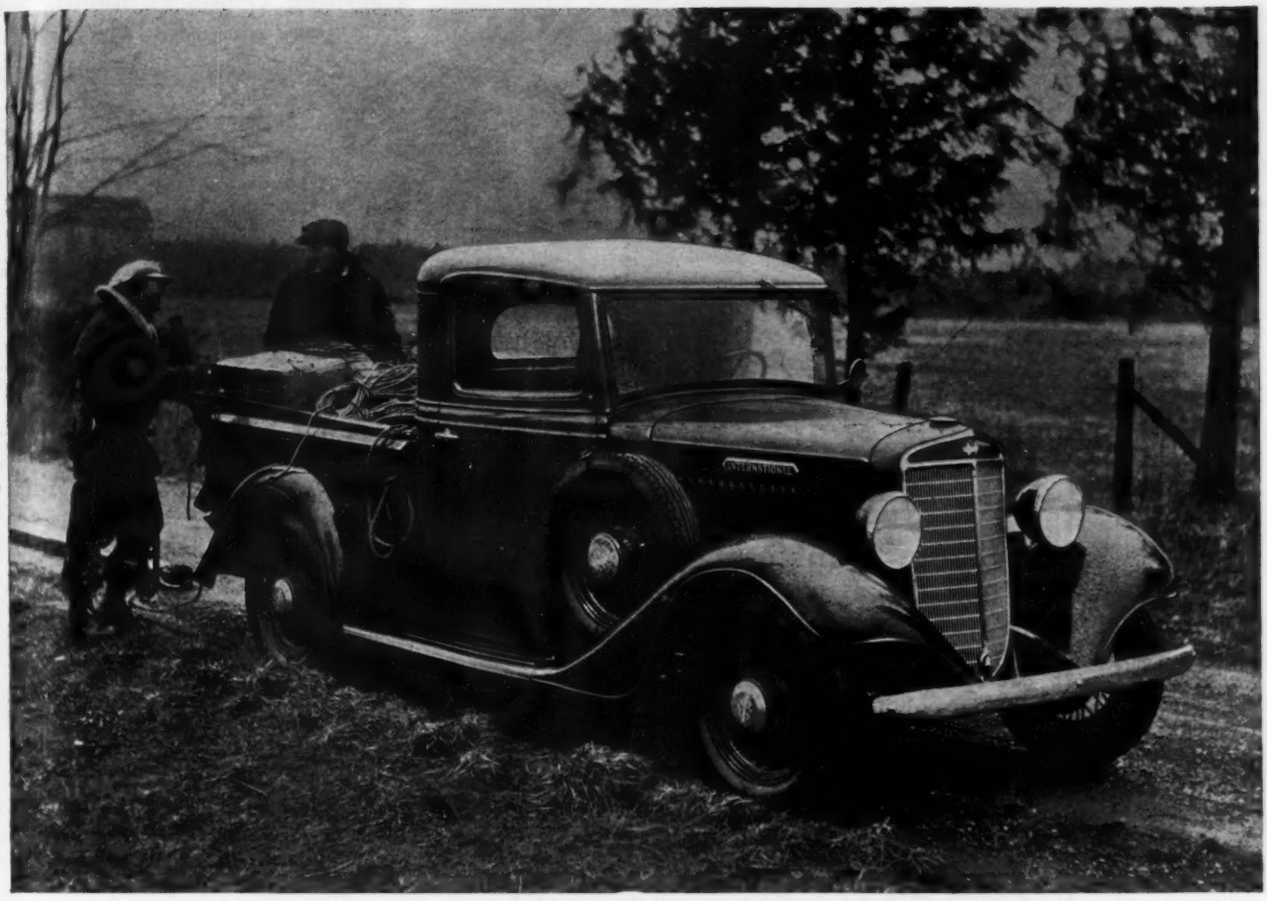
► W. K. LAURIE-DICKSON, one of Great Britain's best-known electrical engineers, died September 30 in London in his seventy-sixth year. At the age of 21 he was superintendent of the Edison Electrical Works, at Orange, N. J., assisting in the researches which led to the cinematograph, the talkies and the wireless valve destined to develop into the radio tube of today.

► WILLIAM J. ROBINSON, 45 years of age, assistant treasurer of the Southern California Edison Company for the past eight years and a member of the Edison organization for 23 years, died October 23 at his home in Los Angeles. His death was due to a heart ailment which several weeks prior to his death necessitated his giving up all activities.

► CHARLES B. KELSEY, public utilities executive and investment banker, died September 17 at Grand Rapids, Mich., in his seventy-third year. Mr. Kelsey organized in 1912 the American Public Utilities Company and was its first president. During his activity in the public utility field he purchased, in partnership with Clarence H. Geist of Philadelphia, companies at Albion and Lansing, Mich., and Valparaiso, South Bend and East Chicago, Ind.

► CHARLES E. HYATT, an electrical engineer for several New Jersey companies before retiring ten years ago, died September 27 at his summer home in Amityville, L. I., after a short illness. A son of the late John W. Hyatt, inventor of celluloid and founder of the Hyatt Roller Bearing Company of Harrison, Mr. Hyatt was born in Newark 62 years ago. Among the companies he was affiliated with were the Crocker-Wheeler Company and the Sprague Company, electrical supply manufacturers of Bloomfield.

► ALLEN H. BABCOCK, widely known electrical consulting engineer, died in California, October 26, of complications resulting from a heart attack. He was 70 years old. In his early work in the electrical industry he was affiliated with the Thomson-Houston Company, the General Electric Company and in later years prominently identified with the development of the electrical utilities in California. From 1912 until his retirement two years ago Mr. Babcock was the electrical engineer for the Southern Pacific Company, with headquarters in San Francisco, and, in this capacity, contributed to many developments in suburban and main line electrification. He was a member of many electrical societies and even after his retirement maintained an active interest in the developments of the industry.



This Half-Ton International Truck with pick-up body is shown on the job near Sumas, Wash., for the Puget Sound Light & Power Company.

Turn ANY hauling problem over to the *FULL LINE* of International Trucks

TENS of thousands of men are doing just that today—*investing* their transportation dollars in International Trucks, for the soundest of practical reasons.

Apply the International solution to your hauling problems—*whatever they are.* International Harvester is at your command with a complete line of trucks ranging from sturdy Half-Ton units in the low-price field up to powerful Six-Wheelers for the heaviest hauling.

Cash in on International's 30 years of TRUCK development. Consult the nearest International branch or dealer about any regular or *special* need for truck chassis and body equipment. Turn your hauling over to International and you can always bank on *liberal returns in performance and economy.* Chassis prices start at $400 f.o.b. factory. Write for 64-page booklet "I Drive Safely."

INTERNATIONAL HARVESTER COMPANY
OF AMERICA
606 So. Michigan Ave. *(Incorporated)* Chicago, Illinois

INTERNATIONAL TRUCKS

Wagner Transformers
for Every Service
The Wagner line of transformers includes all types and sizes of power transformers and distribution transformers, enabling Wagner to supply all your transformer requirements. The accompanying pictures show a few typical Wagner transformers chosen at random to illustrate the diversity of types of transformers manufactured by Wagner. For information on construction details, applications, and installations, write for Wagner Power Transformer, Bulletin 175 and Wagner Distribution Transformer, Bulletin 172.
T135-2
Wagner Electric Corporation
6400 Plymouth Avenue, Saint Louis, U.S.A.
TRANSFORMERS MOTORS FANS BRAKES

Holding Company Regulation

[*Continued from page 23*]

to avoid unnecessary complications and unfair distribution of voting power. It is also specifically provided that this simplification must reduce all holding company structures to a point where there is not more than one layer of intervening companies between the top holding company and the operating companies.

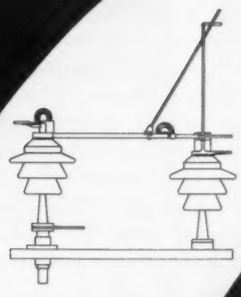
Although the commission is directed to initiate its action under subsection (b) as soon as possible after January 1, 1938, subsection (c) indicates that any orders issued pursuant to this mandate may grant a period of as long as a year for performance, and may even be extended for an additional year where necessary. Thus, it is possible that the process of simplifying holding company systems and corporate structures will not be completed much before 1940.

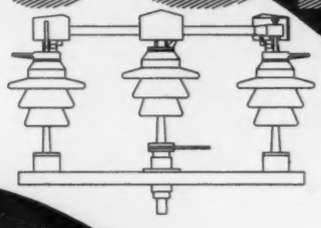
Subsection (d) provides that the commission may enforce its orders by receivership proceedings, where necessary. It is, however, to be hoped and expected that companies will bring about voluntary reorganizations and readjustments so as to simplify their own structures before the commission is compelled to act under Section 11. In order to facilitate such voluntary reorganizations, subsection (e) of Section 11 provides that, any time after the first of next year, any registered holding company or subsidiary company in a system may voluntarily submit to the commission a plan of reorganization or readjustment, and ask the help of the commission in putting this plan through. If the commission approves of the plan and the company finds that it cannot be effected without court proceedings, the commission may, if it consents, be appointed trustee by the court so as to insure an orderly distribution and readjustment of interests. Let me repeat that receivership proceedings under this provision are to be only at the voluntary request of the companies concerned.

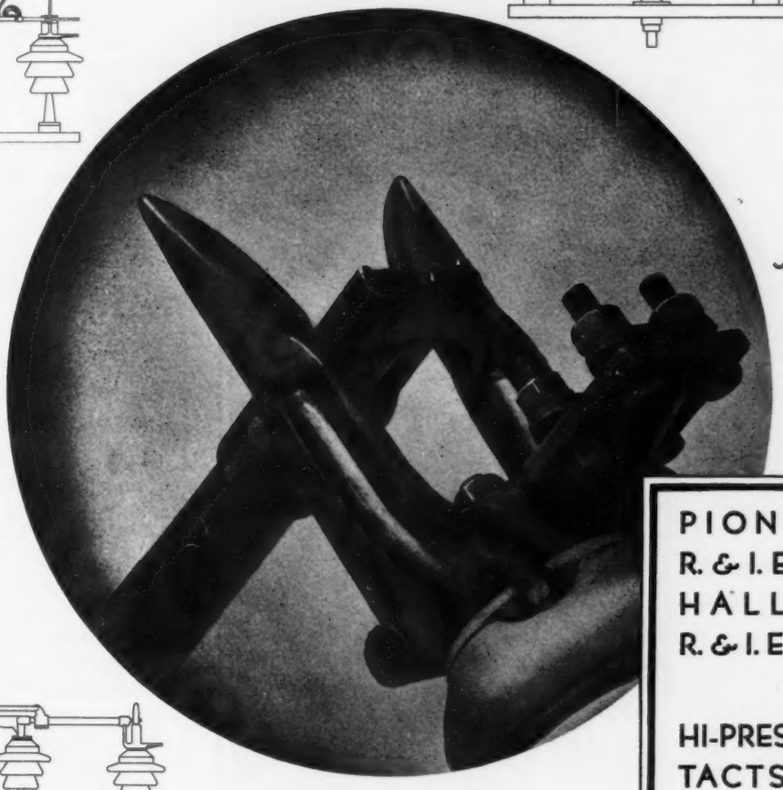
In drafting any legislation which is designed to prevent the recurrence of a manifold series of abuses, it is practically impossible to prohibit in advance every abuse which may be perpetrated and to specify precisely what may and may not be done. If this were attempted by broad prohibition, there would inevitably be much hardship imposed in the case of unforeseen situations. On the other hand, if the

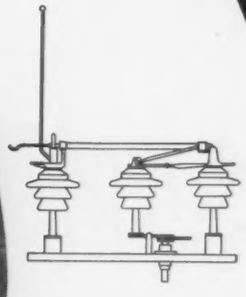
R&IE

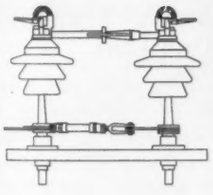
HI-PRESSURE

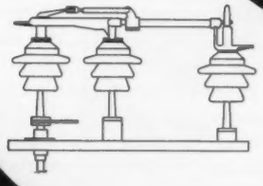












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◉

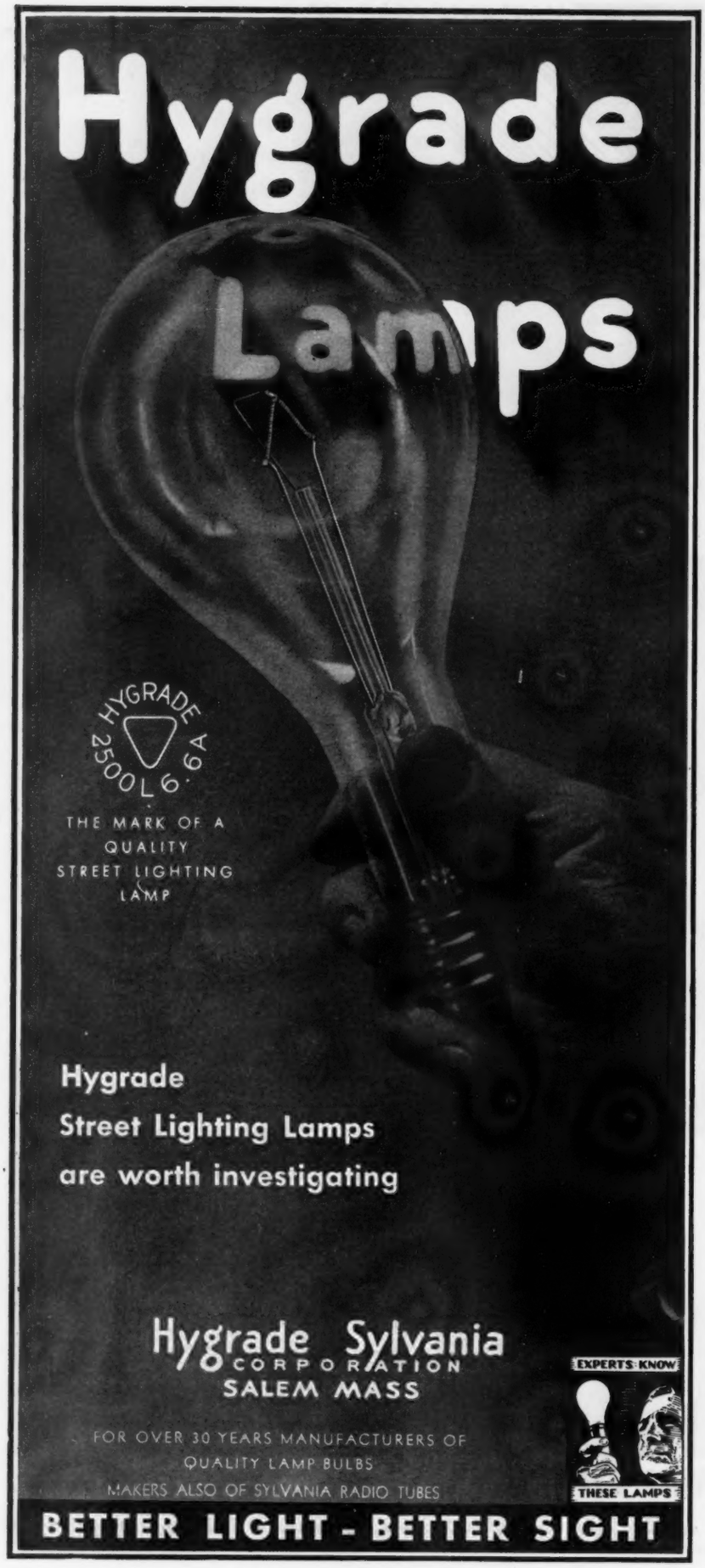
HI-PRESSURE CONTACTS CHARACTERIZE all R. & I. E. PRODUCTS from DISTRIBUTION CUT-OUTS to 220 KV. DISCONNECTS.

CONTACTS

RAILWAY AND INDUSTRIAL ENGINEERING CO., GREENSBURG, PA.

DISTRICT OFFICES AND AGENTS

New York Boston Philadelphia Buffalo San Francisco Pittsburgh Chicago St. Louis Denver Birmingham Kansas City Indianapolis Phoenix Toronto Seattle Los Angeles Summerville, S. C. Houston



scope of the statute were limited to obvious abuses spelled out in detail, it is almost certain that lawyers would find means of evading the act by subtle variations of familiar practices. To prevent this Section 12(f) gives the commission power to regulate all transactions between companies in the same holding company system, or between such companies and their affiliates, which may not be regulated under other sections of the act. It is indicated that these regulations may cover such matters as accounts, costs, maintenance of competitive conditions, disclosure of interest and duration of contracts. Section 12(g) gives the commission a similar grant of authority with respect to transactions between public utility companies generally and their affiliates. You will note that most of the provisions of the act are concerned only with companies that are members of holding company systems. This provision, however, will give the commission power to prevent the perpetration of some abuses similar to those which have characterized holding company activities in cases where the more elaborate regulation providing for holding company systems might not be appropriate.

•

Vapor and Filament Light Combined in One Unit

Light from a mercury vapor and from a tungsten filament is combined in a new type of lamp developed in England by Siemens Electric Lamp & Supplies, Ltd. The tungsten filament operates at normal efficiency and fills the dual functions of controlling the discharge and also emitting light in which is present a considerable measure of red rays supplementing the greenish-blue light from the discharge tube. Since the use of the filament eliminates the need of a choke coil no provision has to be made for power-factor correction, and the new units can be screwed directly into the usual sockets for large lamps. These lamps are to be marketed under the name "Sieray-Dual," according to the *Electrical Review* (London), from which this description is taken.

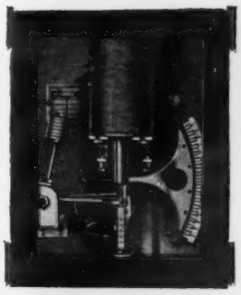
•

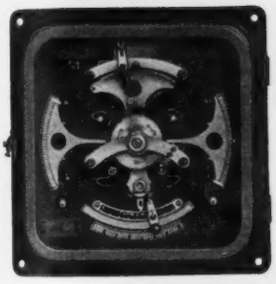
Four-fifths of the Fuel Is Coal

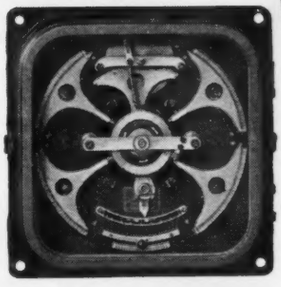
Of the 57,092,000,000 kw.-hr. generated from fuel in 1934, 80.2 per cent was produced from coal, 13.1 per cent from gas, 6.4 per cent from oil and 0.3 per cent from wood, according to an analysis of public utility power production figures by the U. S. Geological Survey.

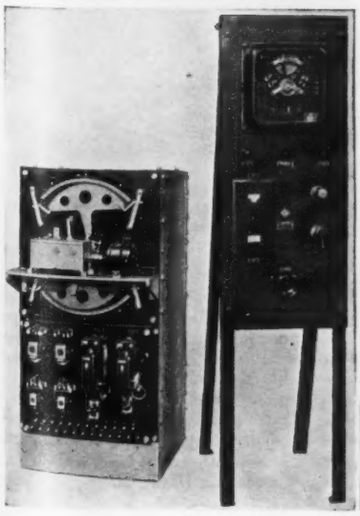
Rocking Contact Voltage Regulators

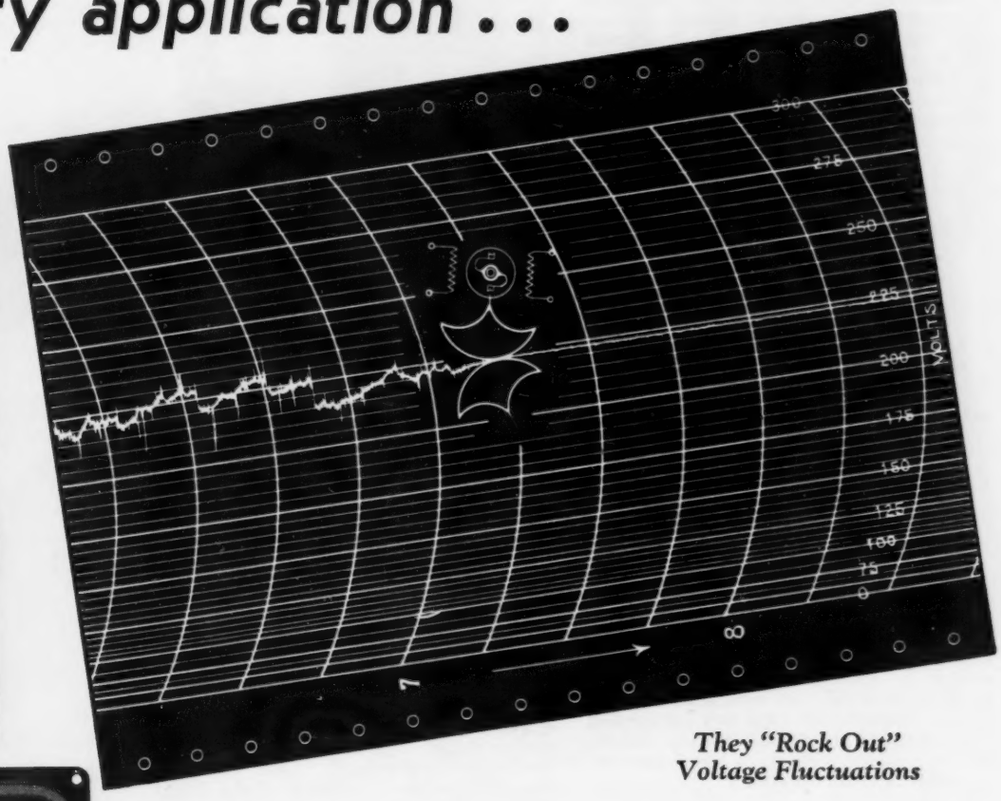
for every application . . .











They "Rock Out"
Voltage Fluctuations

ROCKING Contact Regulators automatically maintain constant voltage during the disturbing period of load changes. They combine speed of operation with simplicity and reliability . . . and will operate for long periods without inspection or maintenance.

The Rocking Contact Voltage Regulator consists of a set of sectors, actuated by a motive system responsive to voltage changes, rocking in a stationary commutator to change excitation requirements for all load conditions. The principle of design is such that in operation no circuit is continually opened and closed, eliminating pitting and frequent renewal of contact points. There are no oil or air dashpots requiring minute adjustment and frequent inspection and no complicated initial adjustment of counterweights and linkages. All moving parts are light in weight and are suspended in bearings requiring no lubrication. Will not cause radio interference.

The Allis-Chalmers line of "Rocking Contact" generator voltage regulators has been further developed to include a voltage adjuster (above) for the small units and a rheostatic type regulator (below) for the large units. It is now possible to obtain this successful design for all applications from the smallest to the largest.

More than 25,000 Rocking Contact Regulators are in successful operation. ***Write for descriptive Leaflet 2142-A.***

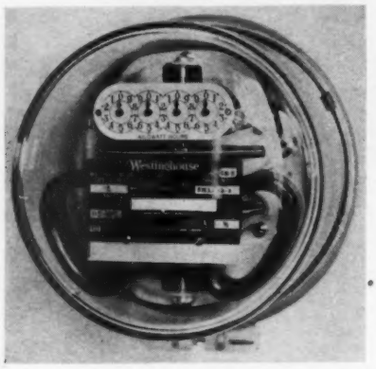
ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —

NEW EQUIPMENT

Two-Element Watt-Hour Meter

Demands for development of detachable metering for two-element network applications are met by this meter. It features low installation cost, protection against current diversion and accessibility. The meter has advantages of simplicity and interchangeability. It can be substituted for any single-phase type S detachable meter by

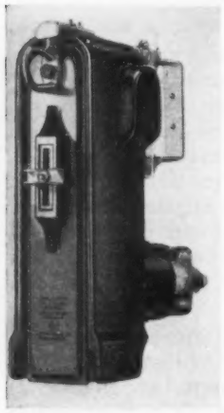


Type CS-5, two-element detachable meter. **Westinghouse Electric & Mfg. Co.**, East Pittsburgh, Pa.

changing one of the terminal blocks on the type S socket. Thus it can be used in many three-wire installations where loads are large enough to warrant use of a two-element meter instead of the conventional single phase. The new meter has two independent electromagnets, a two-disk moving element and is provided with space for demand attachments and accessories.

•

Fuse Cutout and Pothead



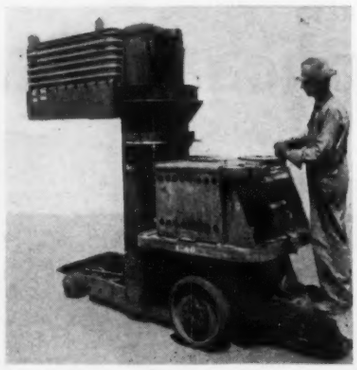
Designed for use where an overhead circuit is to be connected underground through fuse cutouts. The wiping joint is tapped and plugged and the space surrounding the cable inside the pothead can be filled with compound. Available with switch blade instead of fuse cartridge.

Rated at 5,000 volts, 150 amp. **Line Material Co.**, South Milwaukee, Wis.

•

Industrial Lift Truck

Supplied with telescoping uprights, this battery- (or gas-electric) operated truck can elevate loads to a height of 10 ft. or more for tiering. Dual chains have been used to replace cables for hoisting and lowering loads. Automatic cut-out switches



Truck dimensions, 41x28 in. over-all; platform dimensions, 27x54 in. Type ELN-6, 3 tons. **Elwell Parker Electric Co.**, Cleveland, Ohio

are supplied to stop vertical platform travel at upper and lower limits. Interlocking control between controller, drive-motor and foot pedals minimizes the chance of accident. Dynamic breaking can be obtained for ramp operation.

•

Terminal Lugs

"Wire-Grips"; five sizes cover wire and cable for No. 14 to 1,000,000 circ.mil. **Bull Dog Electric Products Co.**, Detroit, Mich.

Formed from electrolytic copper by a special "cold-flow" process, these solderless cable terminal lugs are said to have high conductivity and strength. Clear wire holes give positive visual evidence of the degree of contact between wire and lug. Increased mechanical strength permits firm clamping to insure good contacts.

•

Dead-End Thimble

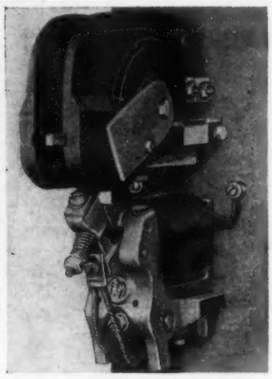
In place of dead-ending farm line conductors directly into the eye of suspension insulators, this thimble may be attached to the insulator and the dead-end made about it. This arrangement permits replacement

Used with conductors ranging from No. 8 to 2/0; clamp strength 12,000 lb. **Ohio Brass Co.**, Mansfield, Ohio

of insulators without cutting the jumper and making dead-ends anew. The thimble diameter provides sufficient radius of curvature so that high-strength conductors can be dead-ended without injury due to bending through sharp angles.

Magnetic Contactor

These contactors are for use on mill crane machinery controllers and other direct-current applications. Arcs formed in the contactor as the circuit is opened are ruptured harmlessly in a narrow path or line centered between but not touching the arc shields. The principle used causes the arc to break



"Line-Arc"; sizes up to 800 amp. capacity; operating coils designed for 230 volts d.c. or less. **Electric Controller & Mfg. Co.**, Cleveland, Ohio.

quickly and clean. It is not allowed to play around on local areas, it is declared. Under normal conditions the contacts never reach the temperature of electronic emission.

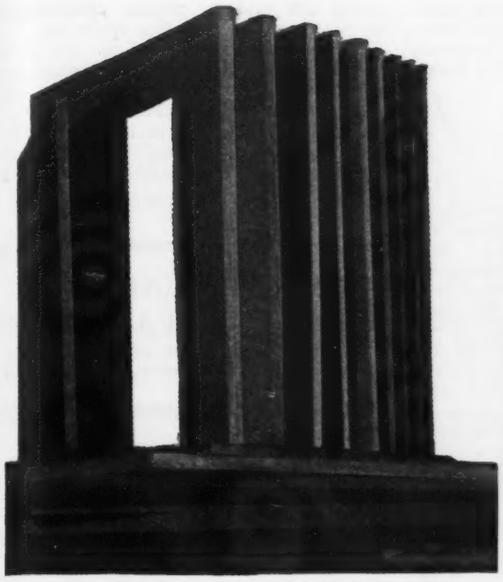
•

Electric Thickness Gauge

Thickness of porcelain enamel, paint or other non-magnetic materials which have been applied to flat sheets of steel or iron can be directly measured with this electrical gauge. A small indicating unit and a half-pound gauge head make up the instrument. When the face of the gauge is held in contact with the surface to be measured the

Thickness ranges of 1 to 5, 2 to 10, 5 to 25, 10 to 50 and 20 to 100 mils are obtainable; portable; operates on 110 volts, 60 cycles; weight, 7¼ lb. **General Electric Co.**, Schenectady, N. Y.

thickness can be read directly on the indicating instrument. Operation is based upon the reluctance of a magnetic circuit passing through a coil in the gauge head and through the steel directly under the portion of the material upon which the gauge head is placed. Since the greater part of the circuit reluctance is produced by the non-magnetic material the indication obtained will depend on the thickness of the material being measured.



Design to use DILECTO

SHEETS

RODS

TUBES

DILECTO is a laminated phenolic material made in standard sheets, rods and tubes. It has high electrical insulating properties, great mechanical strength, is light in weight, and adaptable to most all machining operations. It is a product that retains its insulating properties, even when exposed to moisture or high humidity.

The individual properties of **DILECTO,** such as surface resistance, dielectric strength, machinability, or chemical inertness, are not alone responsible for its widespread use in every industry. It is the unusual combination of these properties in one material which has resulted in the extensive use of **DILECTO** to replace many other materials.

As **DILECTO** is made entirely by our own organization, this unique combination of properties and quality is maintained throughout every phase of its production, including even the manufacture of the raw materials. Every **DILECTO** sheet, rod, tube, or fabricated part that leaves a Continental-Diamond plant must conform to our high production standards, all of which are under laboratory control.

Send us your blue prints or sketches and let us show you how **DILECTO** can be used in your product.

CONTINENTAL-DIAMOND FIBRE COMPANY

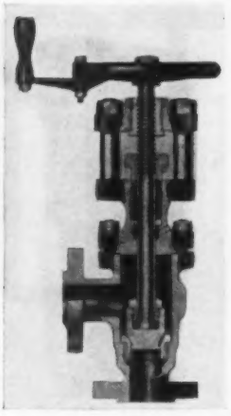
NEWARK, DELAWARE

District Sales Offices:

Chicago, Cleveland, New York, Los Angeles, San Francisco
Spartanburg, S. C., Bridgeport, Pa. In Canada, Diamond State Fibre Company of Canada, Ltd., 356 Eastern Avenue, Toronto, Canada.

Hard-Seat Blow-Off Valve

This disk and seat blow-off valve has a body which is a flanged steel forging of angle pattern, with side outlet. The bottom flanged inlet is screwed in and welded. A stainless steel seat ring, heat treated and ground, is screwed into the nozzle on the lower end of the body. The stainless steel disk is attached to the stem by a disk nut, pinned in place. When the valve is open the top of disk nut seats against bottom of the bonnet, permitting repacking under pressure. When used in tandem with a seatless valve the hard seat valve is placed next to the boiler and used for blowing.



Made in 1½- and 2-in. sizes for pressures of 600 and 1,500 lb. **Yarnall-Waring Co.**, Philadelphia, Pa.

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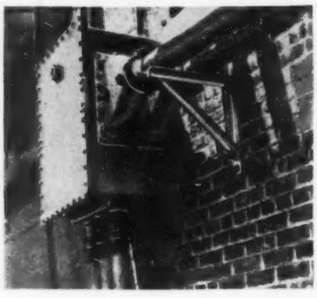
Junction Box

Used in industrial plants or distribution systems for connecting two, three and four 15,000-volt, three-conductor cables, this box permits cables to be disconnected and the



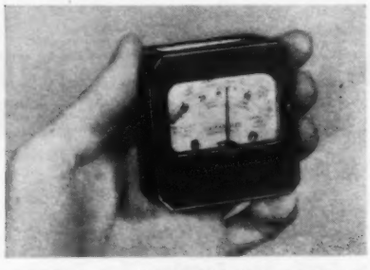
Type OL box; 3-pole; 15 kv., 500,000 circ.mil; 2, 3 and 4-way. **G & W Electric Specialty Co.**, Chicago

circuits sectionalized. It also provides a stop joint which prevents migration of cable-impregnating oils. Cables can be brought in any side of the box.

•

Improved Light Meter

A small rectangular light sensitive cell located in the top of this meter is connected to a sensitive ammeter which is calibrated to read in foot-candles. In addition to giving indications of light intensity, the correct illumination ranges for various seeing tasks are indicated on the instrument. Light intensities up to 750 foot-candles can be measured by this device with the aid of a multiplying factor.



Cased in mahogany-finished textolite; dimensions, 2¼x2¼x1¼ in. **General Electric Co., Nela Park, Cleveland, Ohio**

•

Indoor Bus Support

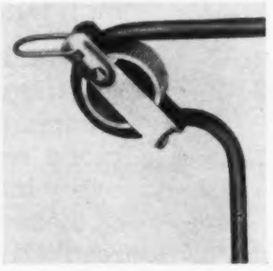
These improved bus supports are provided with ribbed reinforced, high-tension clamps. The junction point of reinforcing ribs can, if desired, be drilled and tapped for a spacer insulator to take up short-circuit stresses between buses.

Made for range of bus sizes and in voltages to 27 kv. **Delta Star Electric Co., Chicago.**

•

Snub-Action Cable Clamp

This clamp can be installed on a continuous run of cable or at the cable end without removing any bolts, rivets or pins. It is self-adjusting for different cable sizes.



Available in two sizes, cylinder 2¼ and 2½ in. with or without log hook. **Line Material Co.**, South Milwaukee, Wis.

The mechanical strength of the bracket is slightly higher than the tensile strength of the largest cable that can be used with it.

•

Breakers for Power Circuits

Individually inclosed circuit breaker protection for the main services of light and power systems is provided by these units,

Type AB-1; ratings 15 to 50, 50 to 100, 50 to 225, 225 to 600; 250 volts a.c. or d.c., 125/250 volts d.c. or 600 volts a.c. **Westinghouse Electric & Mfg. Co.**, East Pittsburgh, Pa.

which are said to require approximately 40 per cent less mounting space than conventional fused safety switches. On all but the 15- to 50-amp. size the thermal and magnetic trip provided is built as a separate unit so the breaker rating can be changed by changing the trip unit. Sheet steel, explosion-resisting, submersion-proof and weather-proof (shown) inclosures are obtainable.

ENGINEERING DATA FROM MANUFACTURERS

Bulletins and catalogs now available to engineers by manufacturers and associations

A discussion of conductors to be used in rural electrification lines is given in bulletin RE-1 (23 pages) published by General Cable Corporation, 420 Lexington Avenue, New York City. Discussion covers qualifications of rural line conductors, form of conductors, factors influencing line design, physical and electrical characteristics, reactance spacing factors and loading tables.

Included in a 50-page catalogue of electric heating units and devices are several pages of engineering charts, formulas, tables and typical calculators to aid engineers in the selection of size and type of heating unit to solve individual problems. Designated as bulletin GEA-1520-B of the General Electric Company.

Data on luminous tube transformers, including footage charts for determination of transformer loading, sign estimating data and servicing units are in a 29-page bulletin No. SM-10 of the Sola Electric Company, 2525 Clybourn Avenue, Chicago.

Information for the Amateur Designer of Transformers for 25- to 60-Cycle Circuits is a recent circular (C 408) of the Bureau of Standards which can be obtained for 5 cents from the Superintendent of Documents. It tells how to lay out, obtain the materials and build power transformers from 1 watt to 10 kw. Drawings, graphs, tables, 25 pages.

How to improve metallic working surfaces by hard-facing or overlaying them with more resistant metal by means of arc welding is comprehensively treated in a recent pamphlet of the Lincoln Electric Company, Cleveland, Ohio. Particular characteristics of electrodes as to how deposited metal stands up under abrasion, impact and corrosion are discussed.

Paper-insulated cable is the subject of General Electric bulletin GEA-1278B. It describes four improvements—"compack-strand" conductor, paper insulation applied in layers, treatment with carbon-dioxide gas, and hydrogen-processed sheath. In addition four types of paper-insulated cable are described—oil filled, shielded type A, nonshielded and pyranol.

A new home-lighting booklet, entitled "Light in the Home," for use by merchants, jobbers and utilities who sell to the residential market, is announced by the Westinghouse Lamp Company as part of its plan to support the Better Light—Better Sight Movement. It discusses home lighting in detail and can be used as a handy authentic guide to correct lighting practice by home owners. Available unimprinted for $50 per thousand.

A 15-page section devoted to facts, data and formulas pertaining to wire rope is included in a 90-page catalogue (No. 34) of the Wire Rope Corporation of America, New Haven, Conn.

STRONG
Needs no concrete envelope.

PERMANENT
Immune to electrolysis. Absolutely weatherproof. Highly resistant to soil corrosion.

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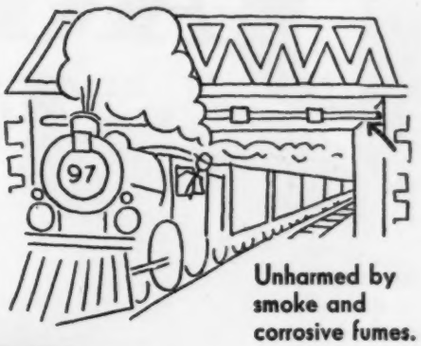

Unharmed by smoke and corrosive fumes.

check its six points of superiority

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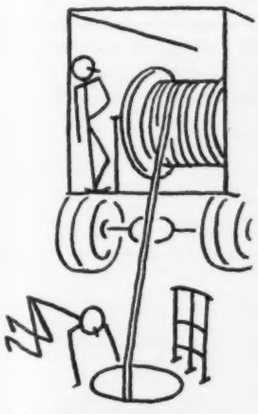
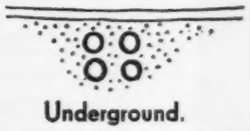


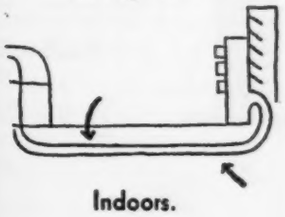
Cables pull without damage.

ADAPTABLE

Outdoors.



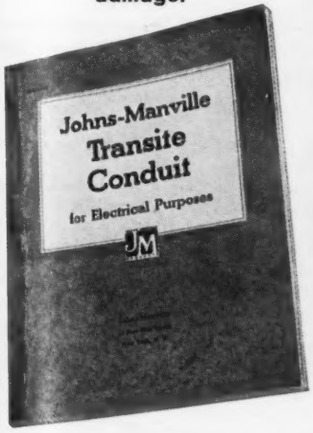
Underground.



Indoors.

LOW INSTALLED COST

Light weight.
Long lengths.
Easily assembled.



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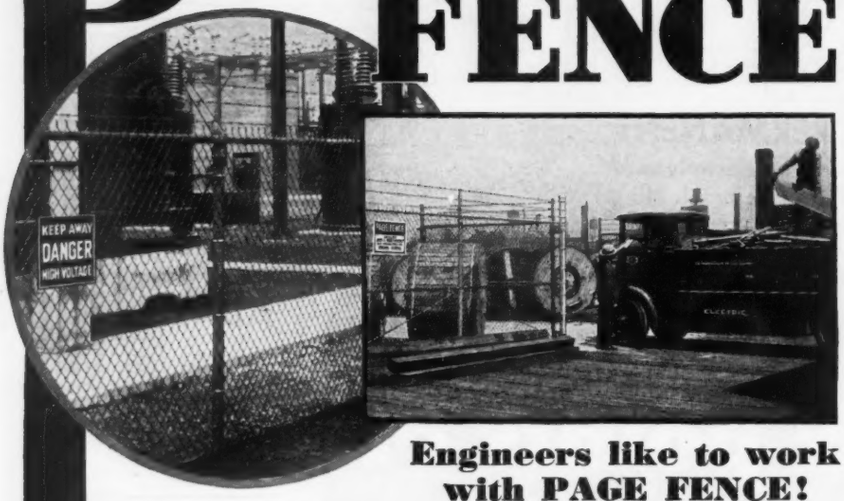

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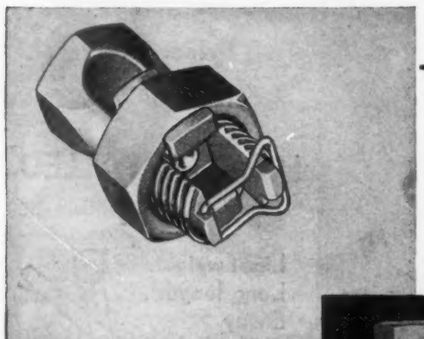

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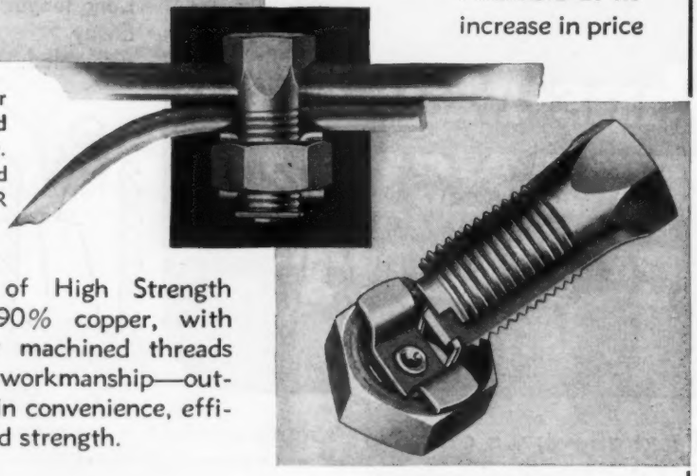

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Self and Mutual Induction Chart

[*Continued from page 37*]

will give a value of 4.65 volts drop on the scale marked "Volts Drop in Phase with Current." From this intersection lay a straight edge (2) to the 70 deg. point on the "Power Factor Angle 'I'" scale. At the intersection of this line and the "Volts Drop Components" scale the imaginary voltage drop is read as 4.5 volts. In the same manner the straight edge (3) is laid from the 4.65 volts drop point to the 70 deg. point on the "Power Factor Angle 'R'" scale. This will give the real component drop of 1.6 volts. The imaginary drop is $-j4.5$ volts and the real is $+1.6$ volts, as can be seen from Fig. 2.

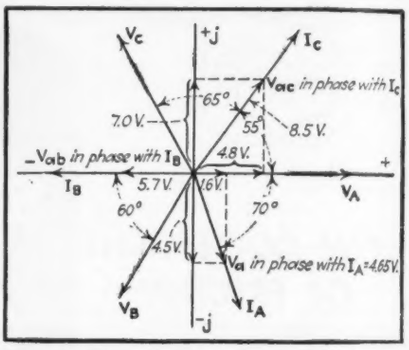

Fig. 2—Vector diagram of mutual and induced voltage drops in one phase of a three-phase circuit.

To make it possible to refer the drops directly to the original voltage, the diagram is drawn (not to scale) with the phase in which the drop is to be calculated on the reference axis.

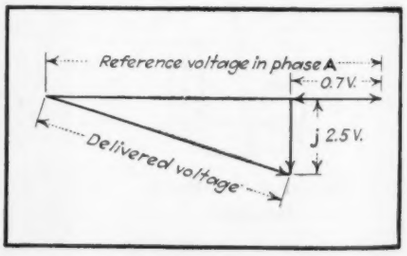

Fig. 3—Vector diagram of drops due to self and mutual induction.
Not to scale.

Then to find the mutually induced drop in A phase due to the current in B phase, assuming 95 amp. in B phase at a power factor of 60 deg. lag, and 14 in. between A phase and B phase wires, lay a straight edge (4) from the 95-amp. point on the "Line Current" scale to the point indicating 14-in. spacing on the scale at the extreme right. This will give a reading of 5.7 volts drop in phase with the current. As this will also be in phase with the voltage in A phase it can be added directly as —5.7 volts.

To determine the mutually induced drop in A phase due to C phase, assuming 110 amp. in C phase at a power factor angle of 65 deg. lag, and 30 in. between A phase and C phase wires, connect the points (5) on the "Line Current" and "Spacing" scales as before. This gives a value of 8.5 volts drop in phase with the current. In order to find the components of this drop the angle between it and the reference voltage must be known. This can be determined

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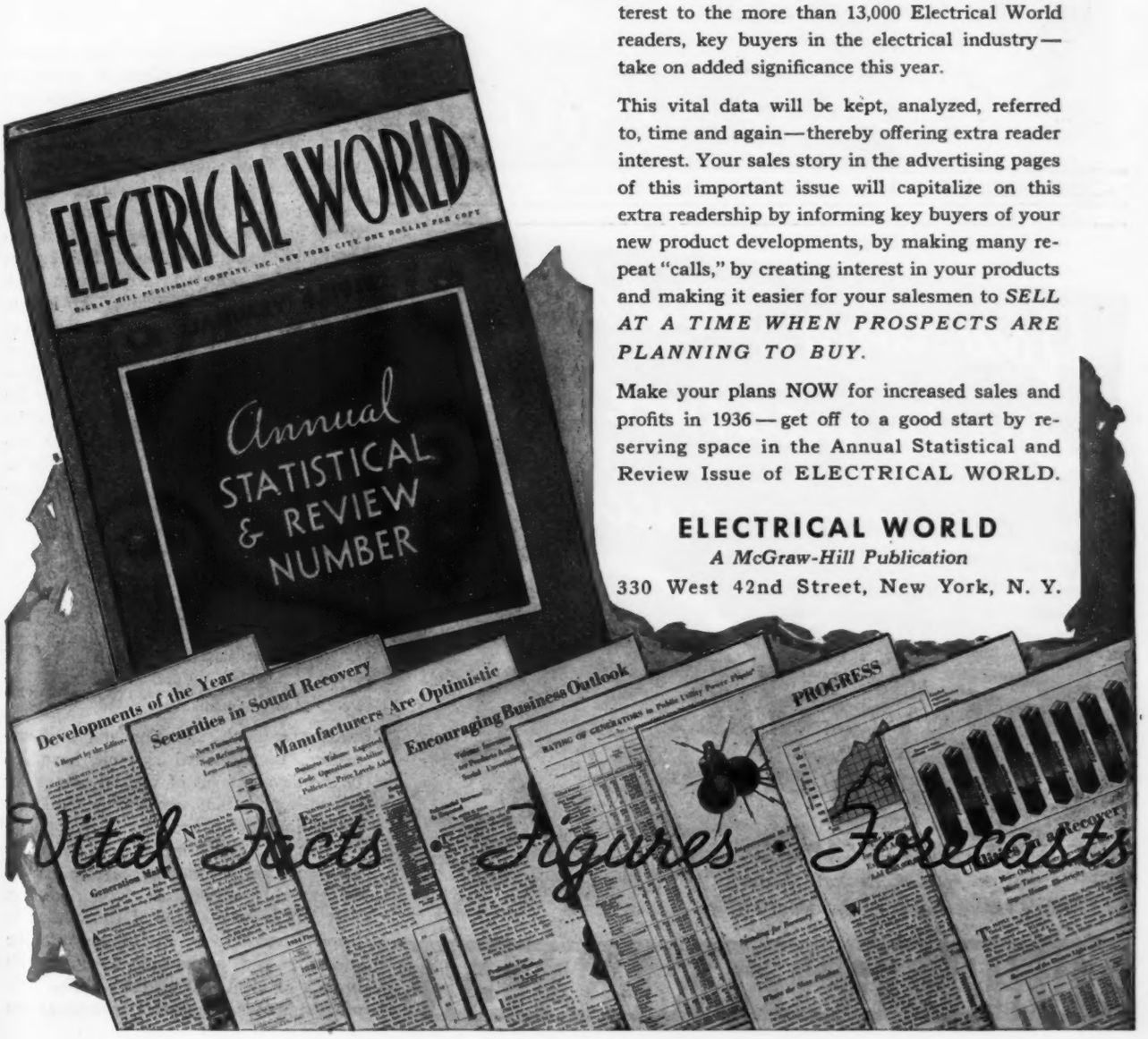
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TONG TEST AMMETERS

from the phase angle. In this case it is 55 deg. Connect the point 8.5 on the "Volts Drop in Phase with Current" scale with the "Power Factor Angle 'I' and 'R'" scales at 55 deg. (6) and (7) and obtain values of $+j$ 7.0 volts drop imaginary and +4.8 volts drop real, respectively, on the "Volts Drop Components" scale.

The voltage drop components are then added algebraically and the net effect on the reference voltage found as shown below:

Components	
I	*R*
$-j$ 4.5	+ 1.6
.....	— 5.7
$+j$ 7.0	+ 4.8
$+j$ 2.5	+ 0.7

To determine the voltage drop in the other phases the same procedure is followed.

BOOK REVIEWS

Relay Systems: Theory, Application

By I. T. Monseth and P. H. Robinson. Published by McGraw-Hill Book Company, New York. 541 pages, illustrated, Price, $6.

Before launching into seven chapters dealing with the technique of protective relaying, there are five mathematical and vectorial chapters treating symmetrical components and the calculation of all probable manifestations of fault currents. No pretense is made that the solution can be rendered simple and consequently these sections are for the advanced student and the field specialist. Subsequent "application" chapters are in form readily grasped by the operator who is concerned with function and performance of relays for protecting apparatus and lines against faults of practically all origins. As a consequence the book stands as the principal comprehensive source of guidance in relay technique for power systems. Avoidance of detailed description of particular models of relays is commendable in a book dealing with a science that is evolving so rapidly.

•

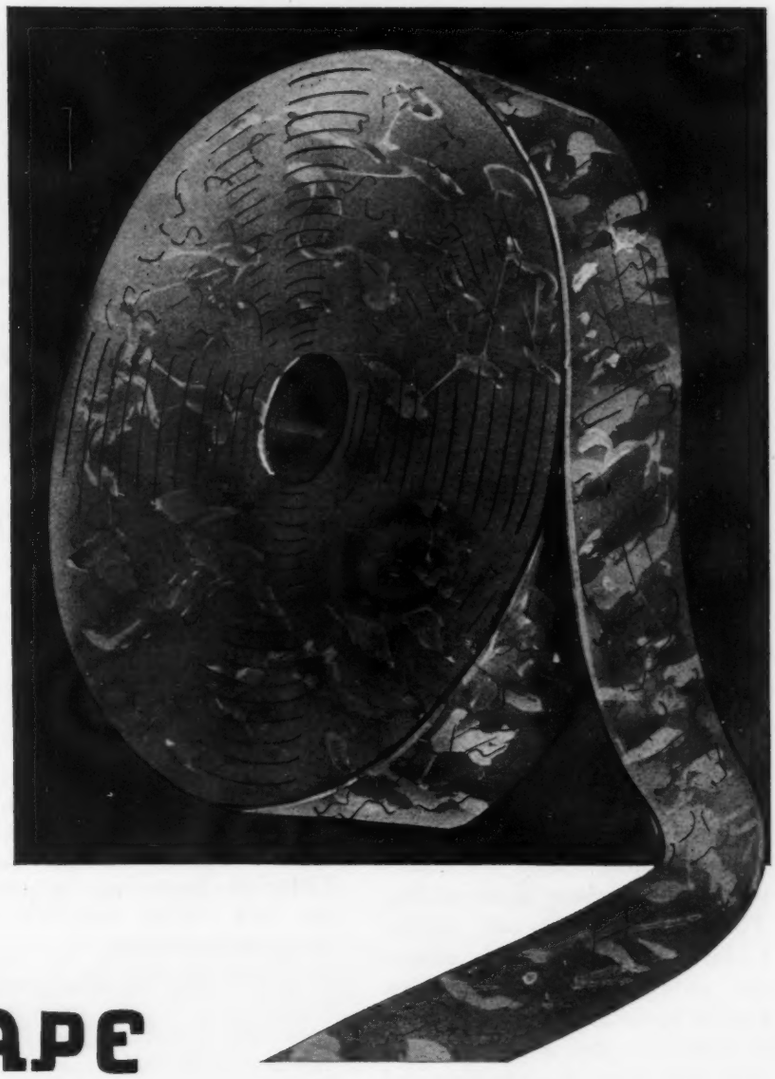
Die Technik der Fernwirkanlagen

(Remote indication and control)

By W. Stäblein. Published by R. Oldenbourg, Munich. 304 pages, 172 illustrations. Price 15.00 reichsmarks.

Geographical expansion and interconnection of electrical systems have led to the development of various means for indicating distant conditions and for controlling the operation of remote apparatus, thereby bringing into existence an important technology involving both power and communication engineering.

It has been the aim of the author to bring together a discussion of the methods and apparatus used in this branch of electrical practice. The style of treatment is descriptive, with numerous



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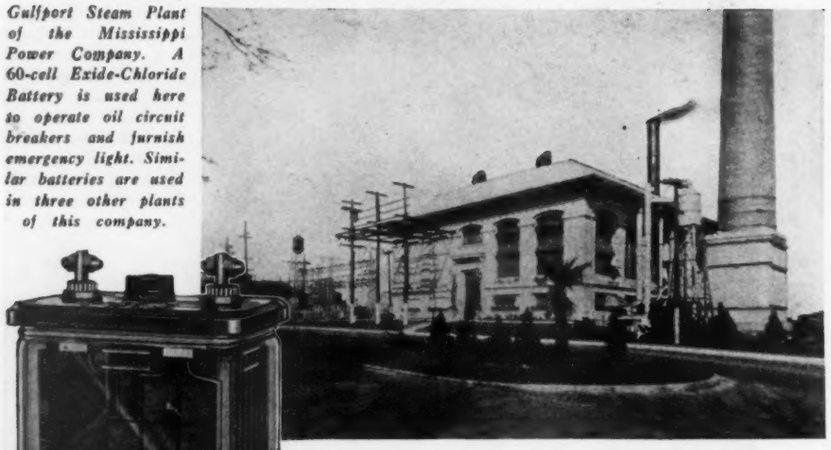
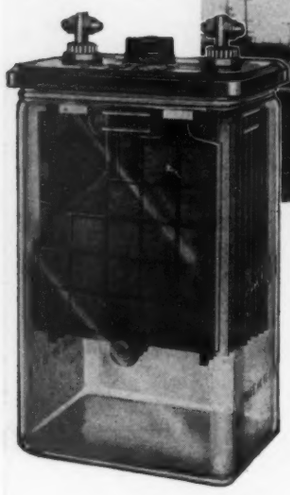
Gulfport Steam Plant of the Mississippi Power Company. A 60-cell Exide-Chloride Battery is used here to operate oil circuit breakers and furnish emergency light. Similar batteries are used in three other plants of this company.





In the South, too, the Exide-Chloride is Recognized as the Finest Obtainable

IN the matter of equipment, the Mississippi Power Company will not compromise with quality. Only the best is acceptable. That's why a 60-cell Exide-Chloride was chosen to ensure the unfailing operation of oil circuit breakers and to provide emergency lighting in the Company's Gulfport Steam Plant and its adjacent 22KVA substation. In three of its other plants, the Mississippi Power Company uses Exide-Chloride of the same size for similar service. In addition, the Company uses, throughout its system, numerous 12 and 24-volt Exide Batteries for tripping and carrier current telephone service.

There is significance in the fact that so many plants, all over the country, depend upon Exide-Chloride Batteries for control bus and similar services. Yet it is not surprising.

For Exide-Chlorides have no counterpart in the storage battery industry. Capable of standing up, even under unfavorable operating conditions, quick to recuperate after frequent high discharges, and lasting for years with minimum expense, the Exide-Chloride merits your most careful consideration.

Write us for information about this remarkable battery or call upon us to help you solve any of the battery problems confronting you.

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circuit and schematic diagrams. Coherence has been secured by a functional arrangement, the objective being first outlined and followed by a discussion of the principles underlying various modes of attaining it, usually calling for a balancing of favorable and unfavorable characteristics. The book should be of particular interest to transmission engineers, system operators, load dispatchers and officials charged with ultimate responsibility for system layout.

•

Electrical Year Book

Published by Emmott & Company, Ltd., 31 King Street West, Manchester, England. 311 pages. Price 1/10 net by mail.

A chapter on rectifiers has been added to this year's edition of this annual, presenting useful tables and data, operating characteristics of apparatus, measurement technique, lighting and wiring principles as the practical man wants them quickly and cheaply.

•

Elektrische Oefen

(Electric Furnaces)

By Adolph Bräuer and Josef Reitstötter. Published by Akademische Verlagsgesellschaft; Leipzig. Second and third issues. Price per issue 28 reichsmark; to subscribers, 22 reichsmark.

When completed this work is to constitute one volume of a series on "Progress in Chemical Apparatus." This volume is to be a compendium of German patents on electric furnaces arranged by type, function and mode of construction, with critical comments. Experience in foreign countries, especially England and the United States, as revealed in their patent literatures, is also being considered. The classified lists serve as a cross-reference to the German patent abstracts arranged numerically in a separate compilation. The entire volume will comprise about 900 pages, to be published in six issues, each containing a group of pages in each of the parallel lists. Three of the issues are now out, the first having appeared about a year ago. Such a compilation ought to be of great value to inventors and workers in the patent field.

•

"Luminous Architecture"

By G. Ganesi and A. Cassi Ramelli. Published by Ulrico Hoepli, Milan, Italy. 168 pages, 216 illustrations. Price, 80 lire.

This book tells the story of luminous architecture largely by pictures selected from this country and Europe. Most of the illustrations from the United States have appeared in the *Transactions* of the Illuminating Engineering Society and the committee on light in architecture and decoration of the society. A. L. Powell, chairman, co-operated with the authors in supplying material.

Among the notable examples from the United States are several views of the Century of Progress at Chicago, Radio

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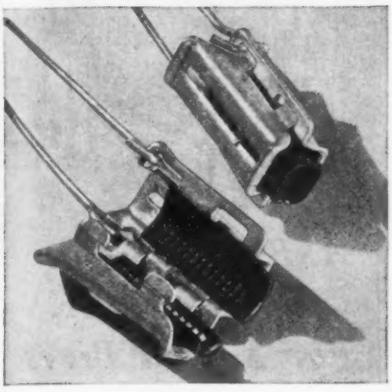
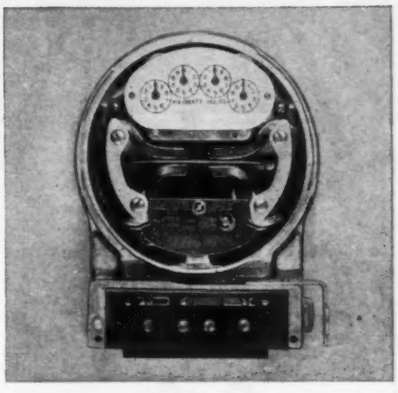


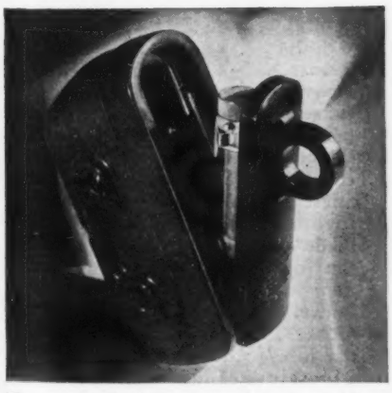
House Brackets. Heavy responsibility rests on the wedges employed in this device. Exposed to constant physical strain and extremes of weather, they must retain unfailing insulation value. After extensive research, Hubbard & Co. adopted Bakelite Molded as the superior material for wedges in the Hubbard wedge-grip bracket.

THROUGHOUT the electrical industry, Bakelite Molded is employed for a constantly increasing number of applications where the major requirements are permanently high insulation value, precision of form, dependable operation, and long, faithful service under trying conditions.

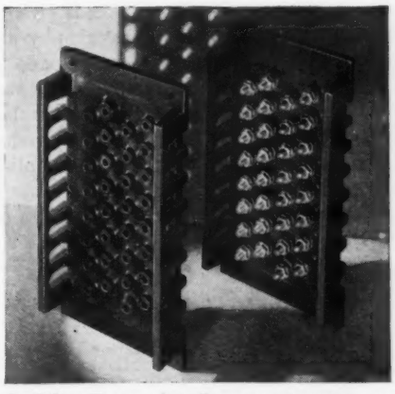
The examples illustrated offer but slight indication of the widely varied usefulness of this versatile modern material. For information on other present applications and specific properties of Bakelite Molded, engineers and manufacturers of electrical equipment and devices are invited to write for our Booklet 3M, "Bakelite Molded".



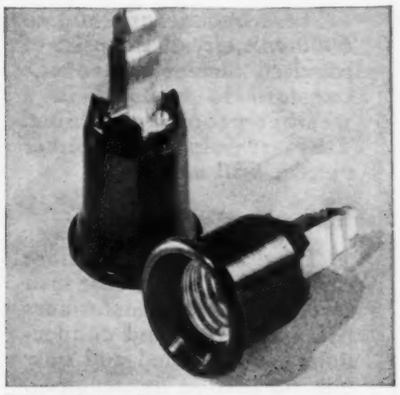
Watthour Meter. Four leading meter manufacturers have adopted interchangeable terminal blocks for their watthour meters. These blocks require great accuracy of dimension, high insulation value, strength, and resistance to extreme atmospheric conditions. Bakelite Molded was the unanimous choice of the engineers because it fulfilled every requirement.



Fuse Cut-Out. The heavy Bakelite Molded door of this L.M. disconnecting fuse cut-out gives positive protection against shocks during inspections or renewals. Besides offering safety, Bakelite Molded does not deteriorate, and retains its electrical and physical properties for an indefinite length of time.



Cable Terminals. Cook Electric Co., who pioneered on the use of Bakelite Molded for insulation blocks of pole cable terminals, state: "The ability of Bakelite Molded to withstand the elements; its high tensile strength, high insulation value, plus low absorption properties, justified our adopting it five years ago."



Mogul Sockets. In forming the heavy shells of these lamp sockets from Bakelite Molded, the Line Material Company has realized, not only important electrical advantages, but also practical insurance against deterioration and failure of the sockets under any climatic or atmospheric conditions.

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2 Lower maintenance expense.

3 Suitable for direct or conduit connection because meter leads are brought to one point.

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DRY-TYPE TRANSFORMERS

City Music Hall, New School for Social Research, the ballroom of the Hotel St. George, the Integrity Trust Company of Philadelphia, Center Theater, New York City, and several ornamental luminaires by American designers.

The material is divided into three sections—exterior illumination, interior illumination and decorative luminaires. Credit is given to the architects and engineers responsible for the installations and to the designers of the lighting equipment.

•

Applications de l'Electricité

By A. Curchod and Collaborators. Published by Dunod, 92, Rue Bonaparte, Paris 6, France. 832 pages, 639 illustrations. Price, paper, 144.00 francs.

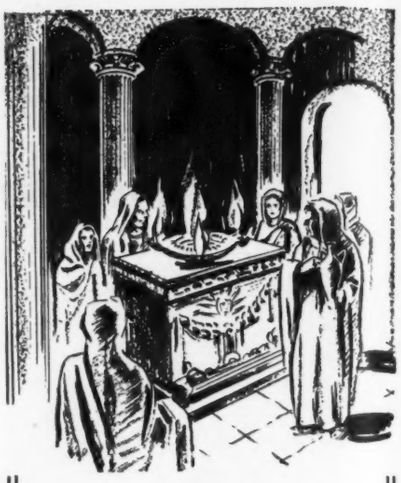
Fourth in a series entitled "Memento d'Electrotechnique," this volume has been preceded by others on electricity and magnetism, on machines and apparatus and on generation, transmission and distribution. It is devoted to problems of the kind arising from conditions imposed by the receiving apparatus. There are two distinct parts. Five chapters, or somewhat less than half the book, are given to lighting, machine drives in various industries, traction, thermal and electrolytic applications. These concern the industrial electrical engineer. Discussions are brief, practical and accompanied by numerous data based on experience. The rest of the book deals with communication and radiation. Generous space is given to the section on telephony, telegraphy and television. More use is here made of mathematics in analyzing the performance of various devices. X-rays get the last 100 pages—theory, propagation, production, industrial and therapeutic applications. The whole constitutes a useful reference work of a somewhat encyclopedic type.

•

VDE Fachberichte

Proceedings of the Association of German Electrical Engineers.) Published by VDE, Bismarckstrasse 33, Berlin-Charlottenburg 14, Germany. 152 pages, 200 illustrations. Price, 10.20 reichsmarks.

This publication contains the 44 papers with discussions presented at the recent convention of the association, covering many branches of the field of electrical technology. The scope of the papers can be only roughly indicated. Topics include the protection of generators in industrial plants, d.c. versus polyphase distribution, network operation and protection, relation between the electrical industry and employment, high-tension dielectric phase-angle measurements, heat flow and stresses in turbine runners, welding, television, communication. Small type and large pages, 6¾x10 in. of print, give the equivalent of a large book, of interest to electrical engineers in the various branches of the profession.



ASBESTOS WICKS For Sacred Fires

In Roman times the sacred fire of the goddess Vesta burned perpetually, tended by the Vestal Virgins. The lamp wick for this vestal fire was asbestos, the same non-combustible material used today in high-temperature electrical insulation. Another historic use was for making the shrouds that covered the funeral pyres of ancient kings. The Isle of Cyprus was an early source of the fibrous mineral.

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Research has brought to light many curious as well as valuable facts about materials for electrical insulation. And, for 50 years, Westinghouse has maintained constant research to develop the finest possible insulation. Westinghouse insulating materials are made to keep your equipment on the job. Make your insulation dependable . . . specify Westinghouse. Send for new booklet C-2033, "Making Insulation Fit the Job." Address Westinghouse Electric & Manufacturing Co., Dept. 100, East Pittsburgh, Penna.

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R-89008

Recent Rate Changes

Pacific Gas & Electric Company has filed new rate schedules, to take effect in January, which will benefit customers of all classes to the extent of $4,500,000. Four million of the rate slash will apply to Pacific Gas customers and the balance to those on the San Joaquin Light & Power Company and Midland Counties Public Service Corporation lines. Increased usage, economies due to refinancing and reduced operating expenses made the reductions possible. New domestic schedules, cutting the top rate in incorporated areas from 4.5 cents to 4 cents and reducing the rates in the second block from 3.5 cents to 2.5 cents, will result in a saving of approximately 11 per cent. For maximum users of 150 kw.-hr. per month the saving will be over 20 per cent. In rural areas the rates are also reduced ½ cent per kilowatt-hour for the first and second block of the rate. These new schedules will result in savings to domestic users of approximately $1,925,000 a year. Commercial lighting customers will enjoy reductions between 9 and 10 per cent. Rate schedules have been simplified to permit a combination alternating-current commercial lighting and industrial power rate, which, in effect, eliminates the minimum demand charge for small power users by having this absorb the charges for lighting kilowatt-hours. Total savings for commercial and industrial customers are estimated at $1,000,000 annually. Agricultural power customers also are benefited by the new schedule, which incorporates a new form of minimum demand charge. The minimum charge now entitles the farm user to 150 kw.-hr. of service per horsepower installed. Users of less than 250 kw.-hr. per horsepower installed will thereby obtain a 14 per cent reduction and users of more than the amount will save 25 cents per horsepower of demand charges.

•

Conowingo Power Company has been given until November 30 to submit amended schedules of rates and charges for energy to domestic and commercial customers in an order passed by the Maryland Public Service Commission. The company protested the valuation placed on the property by the commission as a result of a recent hearing (ELECTRICAL WORLD, October 26, page 85) and a public hearing is to be held on the protest.

•

Washington Water Power Company has worked out a special extension plan by means of which more than 200 Inland Empire farmers have obtained electric service in the past eight months. "These farms," John F. Farquhar, general agent said, "could not be served under the usual standard extension policy which conforms to the state rules that the company cannot build lines unless the anticipated revenue justifies the expense. Under our new plan we furnish engineering advice and assistance, the farmers build their own lines and we provide transformers and meters and give them the same rate as the nearest town customers." The company now has several hundred individual and customer-owned lines with a total of 500 such farmer accounts.

•

New York Power & Light Corporation has filed with the Public Service Commission a schedule of revised electric rates applicable in its Gloversville and Amsterdam districts which is estimated to save consumers more than $100,000 annually. The commission permitted the new rates to become effective October 26 without approval or disapproval.

•

Webster and Southbridge Gas & Electric Company's petition for a new rate schedule

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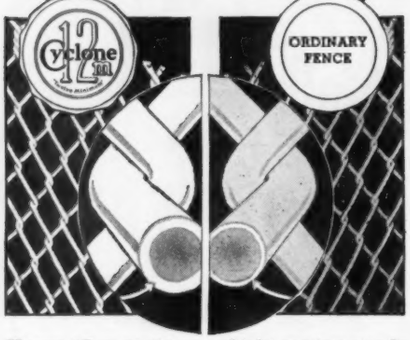

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to become effective August 31, 1936, has been denied by the Massachusetts Department of Public Utilities.

●

Arkansas Power & Light Company will put into effect a new schedule of electric rates which, on the basis of present consumption, will save consumers $293,000 in 1936. The new rate is the result of negotiations between the company and the Department of Public Utilities for several months, following an order that all major electric power companies in Arkansas submit proposals and tentative rate schedules looking to establishment of an objective rate plan (ELECTRICAL WORLD, September 14, page 96). The low cost rates will apply to residential and to commercial customers pending a formal investigation of the company's property values, rate structure, revenues and expenses. The new rate will be known as the "Centennial Rate," because of the fact that 1936 is Arkansas' centennial year. The commission granted the company until December 31 to make any necessary adjustments. Immediate rate schedules will eliminate an extra flat charge for customers who live in homes or apartments having more than four rooms. The department's order will require that as soon as 50 per cent of the company's residential customers have increased their consumption to an average of 35 kw.-hr. per month the company will apply its Centennial rate exclusively.

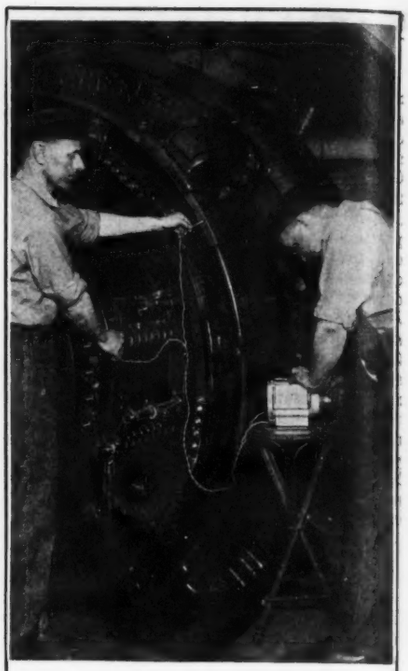
●

Municipal Items

BESSEMER, ALA.—P.W.A. loan and grant for the construction of a municipal electric system has been announced by Administrator Harold L. Ickes. The allotment was approved by the President on September 24, but has been held up until now to permit further examination of the application. The work comprises a 30,000-kw. substation, 50 miles of transmission line and a distribution system. The grant from the 1935 works-relief appropriation, 45 per cent of the cost of the project, is $557,182, and the loan from P.W.A.'s revolving fund is $681,000. Suit attempting to block the allotment is pending in the Supreme Court of the District of Columbia with the Birmingham Electric Company as complainant.

TARRANT CITY, ALA. — President Roosevelt approved on September 24 a P.W.A. loan and grant. The allotment has been held up until now to permit further examination of the applications. On the same basis as the Bessemer allotment, Tarrant will receive a grant of $148,091 and a loan of $181,000. This project covers a distribution system only. In both cases the proposed source of power is the T.V.A. system. A suit is also pending in the Supreme Court of the District of Columbia against this project, with Birmingham Electric Company as complainant.

HUNTINGTON, IND.—Expenses incurred by extension of the municipal electric plant to private consumers was attacked at a recent hearing on appeal from the proposed tax rate of $1.17, which represents an increase of 24 per cent over last year's. W. D. Hamer, for the remonstrators, said that the city administration had taken illegally a balance of $9,094 in the electric light department. He demanded that the electric light department fund for this year be kept within the appropriation made last year, which would make a big cut in the proposed tax rate. The electric department has a budget of about $27,000 for next year, compared with $18,000 for this year. Expenditures in the department since January 1 have amounted to $25,188. A large part of the money, he said, had been spent to put



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on city lines services for which the Northern Indiana Power Company was paid from $700 to $1,000 a year.

WATERLOO, N. Y.—A municipal electric plant to serve the villages of Waterloo and Seneca Falls has been proposed by officials of both villages according to Frank Schott, village clerk of Waterloo. Holding that the Empire Gas & Electric Company has violated its contracts in both villages by not reducing rates as agreed, all members of the municipal boards of the two villages favor construction of a plant midway between Waterloo and Seneca Falls.

DORRANCE, KAN.—Citizens have voted more than two to one against a municipal electric plant. Kansas Power Company serves the community.

CAMDEN, N. J.—Attempts of the Public Service Electric & Gas Company to force the city to pay $30,000, the costs of the utility's suit against a municipal light plant, are being fought. Residents voted last Tuesday in favor of constructing a municipal power plant. Incomplete returns indicated that the proportion of votes favoring the plant was about 22,000, with about 9,000 votes against it.

CORONA, N. M.—Application has been filed with P.W.A. for a loan of $20,436 for establishment of a municipal electric plant and distribution system.

GRENVILLE, N. M.—Application has been filed with P.W.A. for a loan of $24,565 for establishment of municipal electric plant and distribution system.

GRAND FORKS, N. D.—City has voted to construct a municipal plant to compete with the Northern States Power Company.

MEMPHIS, TENN.—City Commission has overruled the protest of the Memphis Power & Light Company and authorized the signing of Memphis' contract with the Tennessee Valley Authority.

COLUMBIA, TENN.—City Council has gone on record as opposing construction of a municipal power distribution system with funds from the Works Progress Administration. The Mayor and Board of Aldermen voted 5 to 4 against carrying out a $204,000 project approved by the W.P.A., consisting of a grant of $92,000 and a loan of $112,000. The Council agreed that it would have to study the problem further before deciding whether to bring Tennessee Valley Authority power to Columbia. The city is under contract to use energy of the Tennessee Electric Power Company until three months after completion of the Norris Dam.

TEXARKANA, TEX.—Judge Randolph Bryant of United States district court has issued a temporary injunction restraining the city and its officials from taking any further steps for a P.W.A. loan and grant to construct a municipal electric light and power plant. The City Council has adopted a resolution for a federal grant of $872,000 for the project, and this application was pending at the time of the issuance of the restraining order. The suit for injunction was filed by the Southwestern Gas & Electric Company, which alleges, among other things, that the company has a city franchise which has seventeen years to run and that this franchise would be voided should the municipal project be carried out.

RAYMONDVILLE, TEX.—City commission has called an election for November 14 to vote on the proposal to issue $125,000 of revenue bonds for the purpose of constructing an electric light and power plant.

YORKTOWN, TEX.—Application for P.W.A. loan and grant of approximately $150,000 for construction of an electric light and power plant and a distribution system has been ordered by the City Council. An order directing P.W.A. to show cause why the loan should not be enjoined has been

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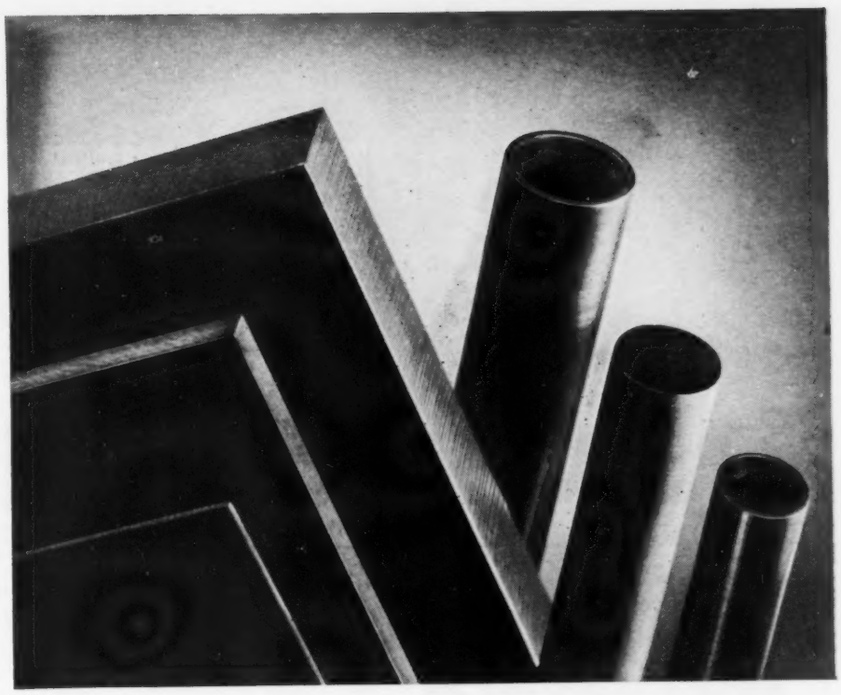

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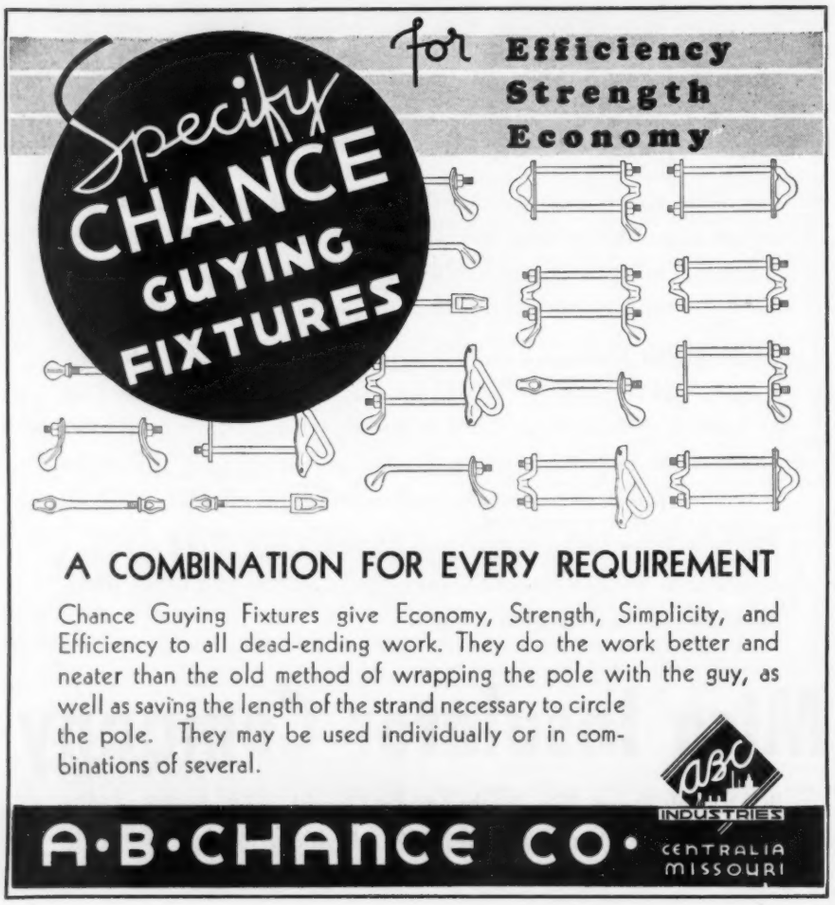
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signed by Chief Justice Wheat of District of Columbia Supreme Court. The complainant was Central Power & Light Company.

UTAH—Six towns have presented proposals to the state planning board for the construction of municipal power plants or distribution systems. The cities are Glendale, Price, Helper, Spanish Fork, Richfield and Panguitch. Utah Power & Light Company representatives, together with officials of the South Utah Power Company, asserted that construction of the plants would be wasteful. The case was taken under advisement by the board.

BRANDON, VT.—Suit to enjoin a P.W.A. loan and grant of $162,000 for the construction of a municipal power plant has been entered in the Supreme Court of the District of Columbia by the Central Vermont Public Service Corporation.

SEATTLE, WASH.—City Light experts have undertaken the task of making a survey of the holdings of the Puget Sound Power & Light Company in Seattle and vicinity, with the co-operation of President Frank McLaughlin of the company and his business and engineering staffs. R. W. Beck, engineer in charge of the survey for City Light, has asked for detailed information concerning the locations, operating costs and values of numerous company properties in Seattle and King County, and for data which would help show the extent to which these duplicate City Light installations and services. Discussing the projected acquisition, Mr. McLaughlin pointed out that "the proposal is one of great magnitude, involving a great deal of property and other factors. King County is the heart of the company's system, with a very large proportion of our loan and output being utilized therein. Our power units are designed to function as a unit; dismemberment of King County from our system would have a vital effect on our operations throughout the balance of the area served. Therefore, extensive engineering and operating, as well as financial studies, are essential, and the question of severance damages is a big factor." Under the Ross program, the power company's properties outside of King County would be left for communities to take over on their own financing arrangements, if they might see fit to join the public ownership program.

MARSHALL, MO.—Bond issue of $90,000 for municipal light and power plant was defeated. Application pending for P.W.A. grant of $106,124 and loan of $129,708 for plant, estimated cost $235,832.

LARCHMONT, N. Y.—Hoping to make Larchmont the first community in Westchester County to build a public power plant to compete with electric service of the Westchester Lighting Company, members of the Westchester Council of Utility Rate Committees have filed with the village clerk a petition for a power plant referendum in November. More than 250 residents of the village had signed the petition, according to Gordon M. Wagner, secretary of the rate council.

CARUTHERSVILLE, MO.—City has filed an application for a P.W.A. grant of $90,832 and a loan of $111,017 to finance the construction of a muncipal light and power plant and distribution system estimated to cost $201,849. If the application is approved the city will issue revenue bonds to cover the amount of the loans.

ST. PAUL, NEB.—In a brief filed with the state Supreme Court the city has opposed the appeal of the Central Power Company from the action of the city in taking over its distribution plant. The company in its brief challenged the legality of an alleged double proposition on the ballot by which the city was empowered to take over the plant under the law of eminent domain.

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Norway Heavy Power User

In Norway, as elsewhere, the world-wide depression has been reflected in a reduced consumption of electrical energy, but unlike most other countries she did not increase her consumption in 1934, or at least in the fiscal year of 1934, which for some of the reporting agencies ended at the middle of that year. The statistics are announced in the annual "Technical and Economic Survey of the Supply of Electricity in Norway" of the Norwegian Watercourse and Electricity Department at Oslo.

The output of industrial plants, notably those serving electrochemical and electrothermal industries, has been declining steadily, whereas the production by plants for public supply increased by 19 per cent from 1930 to 1934. During that period the capacity of plants serving industries has remained unchanged at 845,000 kw. Capacity of plants for public supply was 550,000 kw. in 1930, 627,000 kw. in 1934; in the years between it was successively 532,000, 539,000 and 616,000 kw. Most of this is water power; utility steam plants have stood at 20,000 kw. for the past nine years. Consumption per capita of communities served is 1,450 kw.-hr., but for the whole population it is about 1,020 kw.-hr.

Consumption by Consumer Groups

(Million Kw.-Hr.)

Item	1930	1931	1932	1933	1934
C	4,590	4,550	4,150	3,940	3,710
P	760	720	600	730	830
M	70	80	65	80	75
X	680	709	717	750	778
L	1,530	1,630	1,670	1,750	1,750
T	7,630	7,690	7,200	7,250	7,143

C—Electrochemical and electrothermal industries.
P—Cellulose, paper and wood-pulp.
M—Mining.
X—Miscellaneous industries.
L—Lighting, cooking and heating.
T—Total energy supply.

Statistics are reported for the calendar year or for the year ended June 30, depending on the accounting practice of the reporting agency.

Energy Supply by Sources

(Million Kw.-Hr.)

	1930	1931	1932	1933	1934
I	5,230	5,189	4,630	4,530	4,280
P	2,400	2,500	2,570	2,720	2,863
T	7,630	7,689	7,200	7,250	7,143

I—Industrial plants. P—Public supply. T—Total.

Public Utility Plants

(Fiscal year 1934)

Generator capacity, kw.	627,000
Hydro, kw.	607,000
Steam, kw.	20,000
Cap. leased from industrial plants, kw.	21,000
Step-down transformer, kva.	850,000
Sum of peaks at load centers, kw.	552,600
Energy (at load centers), kw.-hr.	2,863,300,000
Population served*	1,972,500
Financial data, kroner†	
Present plant investment, book.	780,100,000
Investment in power plants	429,900,000
Investment trans. & distr.	350,200,000
Annual revenue	87,600,000
Oper. exp. and cap. charges.	83,100,000

*In rural and urban communities served; total population of Norway is 2,817,000 (World Almanac).
†At present rate of exchange about $0.25.

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SALES OPPORTUNITIES IN NEW CONSTRUCTION

LOUISVILLE, KY. — Kentucky Utilities Company will make extensions in transmission lines for service in number of communities, including 66,000-volt line from Pineville to Somerset, about 50 miles, on which work will soon begin, and new 33,000-volt line from New Haven to Hodgenville, about 11 miles; also number of line extensions in vicinity of Carrollton, Lawrenceburg, Winchester, Versailles and vicinity, with new distributing lines and power substation facilities. Cost close to $325,000.

SPOKANE, WASH. — Commissioner of Public Utilities asks bids until December 5 for power house and control works for new Upriver power station for city water department. Also, until November 14 for motor-driven Tainter gates, hoists, crane, etc., for same project.

ST. CLAIRSVILLE, OHIO — Artcraft Stove Company, Martins Ferry, Ohio, plans installation of motors and controls, conveyors, hoists and other equipment in new plant at St. Clairsville. Cost close to $200,000.

KNOXVILLE, TENN.—Tennessee Valley Authority has plans under way for new transmission line from Wheeler hydro-electric generating plant, now in course of construction, to dam site at Guntersville, with rural distributing lines and power substation facilities in number of counties along route. Cost over $500,000. Plans also in progress for transmission lines and 100 miles of distributing system in rural areas of Meigs and Rhea Counties, with substation and service facilities, estimated to cost $125,000. Plans have been authorized and bids are scheduled to be asked soon for new transmission line from point near Ardmore to vicinity of Columbia, Tenn., for service in connection with phosphate mining developments in latter district, estimated to cost over $300,000; this line will be designed for heavy duty operation and will be extended later to Dickson, close to 35 miles, for power supply for commercial service.

WARREN, OHIO—Ohio Public Service Company plans new steam-operated electric generating plant on local site to replace part of present facilities, for service at Warren, Lorain, Mansfield, Alliance, Sandusky and vicinity. Proposed to begin work early in 1936. Cost close to $2,500,000.

BURLINGTON, IOWA — United States Engineer Office, Rock Island, Ill., receives bids until November 14 for power, control and lighting system at lock and dam No. 18, Mississippi River, near Burlington, including dam power feeders and connections, transformers and regulators, switchboard and accessories, dam grounding system, lock and navigation lighting systems, service bridge lighting system, gas-electric standby power unit for emergency service, two electric tow-haulage units, automatic emergency lighting system, etc. (Proposal 61).

PARIS, TENN.—Has called special election November 18 to approve bond issue of $300,000 for new transmission line, power substation and electrical distribution lines, using power service from Tennessee Valley Authority system.

HOMESTEAD, PA. — Carnegie - Illinois Steel Corporation, Pittsburgh, Pa., subsidiary of United States Steel Corporation, New York, N. Y., plans installation of heavy-duty motors and controls, transformers and accessories, electric hoists, electric cranes, conveyors, regulators and other equipment in new plate-strip mill at Homestead, on which

work will begin early next year. Cost about $15,000,000.

DANVILLE, VA.—Has engaged Charles T. Main, Inc., 201 Devonshire Street, Boston, Mass., consulting engineer, to make surveys and plans for proposed city-owned hydro-electric generating plant on Dan River, about 60 miles from city, including transmission line to city limits, power substation and distributing lines. Plant will be equipped for initial capacity of 12,000 kw. Appropriation of $2,750,000 has been arranged through federal grant and bond issue.

DAYTON, OHIO—Contracting Officer, Material Division, U. S. Army Air Corps, Wright Field, Dayton, receives bids until November 18 for 53,900 ft. of flexible conduit (Proposal 316).

HAMPTON, IOWA—Iowa Public Service Company, Fort Dodge, Iowa, has approved plans for new electric power plant at Hampton, for commercial service in that district. Cost about $100,000, including equipment.

WHITE CLOUD, MICH.—Plans extensions and improvements in city-owned electric light and power plant, with installation of equipment to double present capacity. Cost about $45,000.

ALBANY, N. Y.—A.P.W. Paper Company plans installation of motors and controls, conveyors, etc., in new tissue paper mill addition. Cost about $400,000. Johnson & Wierk, Grand Central Terminal Building, New York, N. Y., are consulting engineers.

BLUE RAPIDS, KAN.—Plans city-owned electric light and power plant, with electrical distributing lines. Cost about $168,000. Financing is being arranged. Paulette & Wilson, Farmers' Union Building, Salina, Kan., are consulting engineers.

BROOKLYN, N. Y.—Signal Supply Officer, U. S. Army Signal Corps, Army Base, receives bids until November 18 for 24,600 ft. telephone cable (Proposal 63).

CHARLOTTE, N. C.—Duke Power Company has plans under way for extensions in transmission and distributing lines for rural electrification in Piedmont district of North and South Carolina, totaling over 300 miles.

PALO ALTO, CALIF.—Plans new street-lighting system, including ornamental units on number of streets and center-suspension type lamps on other thoroughfares, with sodium vapor lighting units for section along State highway. Cost about $125,000. A. V. Youens is city electrician, in charge.

CHARLOTTE, N. C.—Southeastern Brewing Company, Atlanta, Ga., plans new plant at Charlotte. Cost about $100,000.

HOPEWELL, VA.—Allied Chemical & Dye Corporation, New York, N. Y., plans installation of motors and controls, regulators, conveyors and other equipment in new branch plant at Hopewell, for which superstructure will proceed at once. Scheduled for completion next spring. Cost over $800,000.

FORT WAYNE, IND.—Plans extensions and improvements in city-owned electric light and power plant, including installation of additional equipment. Cost about $150,000. P. F. Thiele is engineer, in charge.

DUBUQUE, IOWA—United States Engineer Office, Rock Island, Ill., asks bids until November 26 for power, control and lighting system at lock and dam No. 11, near Dubuque, including central control station and equipment, remote control apparatus, dam power feeders and distribution system, transformers and regulators, dam grounding system, lock and navigation lighting and signal units, gas-electric standby power unit, electric tow-haulage units and complete accessory equipment.

HOUSTON, MISS.—Plans transmission line, power substation and distributing system, securing power from Tennessee Valley Authority system. Fund of $34,000 is being arranged.

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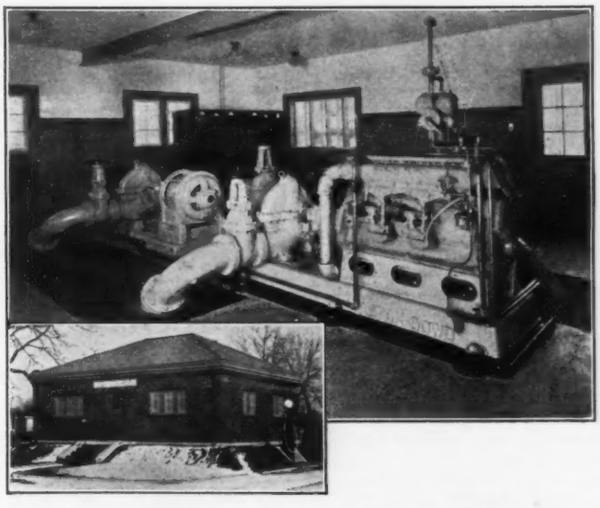

For a standby in emergency the Warwick Water Works, Warwick, R. I., employs a Sterling Petrel 6 cylinder 110 horse-power engine driving a Dayton Dowd centrifugal pump at 1150 R.P.M.

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